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SIMPLIFYING DECISION MAKING:
A PRACTICAL FRAMEWORK

by

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This thesis proposes a decision-making model based on PESTEL (Political, Economic, Social, Technological, Environmental, and Legal) analysis, AHP (Analytical Hierarchical Process), and game theory. The case study used to demonstrate the concept is a 2013 Malaysian crisis wherein foreign intruders occupied a village in Sabah state. The Malaysian government, ultimately, launched a military operation to clear the area. The focus of our study is the decision-making processes of the two rational actors in this case—the Malaysian Prime Minister and the Sultan of Sulu. Game theory and AHP provided structured framework for investigation, particularly in subjective assessment. Each player is assessed by a particular set of criteria independent from the other's criteria. To support these tools, we analyze available literature to formulate PESTEL attributes, which could affect both parties' payoffs in the construct. The combined application of these tools—PESTEL analysis, AHP, and game theory—demonstrates how they mitigate each other's weaknesses. The utility of this model is twofold: (1) it makes the analysis of decisions taken in the past more insightful; and (2) it provides a framework for choosing the optimal course of action when making a decision.

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I. INTRODUCTION

PESTEL, AHP, and game theory are being widely used in the decision-making domain. All three, independently, have their unique strengths as well as some inherent limitations. This research offers a refined and improved decision-making model to resolve a conflict by combining these three proven decision-making tools. Combined, these three mitigate each other's weaknesses and multiply each other's strengths. Game theory is an interactive tool that works well in understanding conflicts and strategy formulation; but has limitations in allocating payoffs. AHP can be beneficial here in providing the payoffs. AHP, itself, is limited by its dependence on a more systematic approach in composing decision-making criteria. PESTEL can come to the rescue of AHP here. At the same time, AHP strengthens PESTEL's weaknesses in quantifying the decision criteria.

By selecting the Lahad Datu standoff of 2013 as a case study for the proposed model, the research offers valuable insights into the crisis through the interactive decision-making process' perspective with consideration of macro environmental factors affecting both players (the Malaysian Prime Minister and Sultan Sulu). It also identifies key elements that influenced the action of both players. Moreover, this research provides a structural framework which can be effectively used for choosing the most appropriate course of action in any conflict situation.

This chapter discusses the fundamental elements that drive and govern this study. In the context of a specific case study, this chapter lays out the analysis of the Malaysian government's decision-making process with the combination of three contemporary decision-making tools—PESTEL analysis, game theory, and the Analytical Hierarchical Process (AHP).

A. BACKGROUND TO THE CASE STUDY

Before going into the specifics of the incident under evaluation, the Lahad-Datu standoff of 2013, it is important for the purpose of clarity to orient ourselves with the geography of Malaysia, as well as to introduce the different actors or groups in this case

study. Malaysia primarily consists of two parts—the Malaysian peninsula (to the West), and the state of Sabah and Sarawak in Borneo island (Figure 1) (Fernandez, 1998).

Figure 1. General map of the region studied (from Lewis & Geelan, 1994).

The rest of Borneo Island (Kalimantan) belongs to Indonesia. Brunei lies as an independent country between the Malaysian states of Sarawak and Sabah. The Philippines lies to the northeast of Sabah (Fernandez, 1998). There are many small islands in this region belonging to Malaysia as well as the Philippines (including Sulu Archipelago) (Meinhardt et al., 1999). Our point of interest is the region in the northeast of Sabah and the Philippines islands of Sulu Archipelago (Figure 2). The population of Sabah is multi-ethnic including a minority population of Suluk people, also known as Tausug. They are originally from Sulu Archipelago, where they have their own so-called Sulu Sultanate. The sultan (Sultan Sulu) lays claim to the whole of Sabah calling it a part of his Ancestral Kingdom of Sulu ("Sultanate of Sulu," n.d.).

Figure 2. Sulu Archipelago (from Meinhardt et al., 1999).

On February 11, 2013, about 100 to 300 armed Tausug from Sulu Archipelago infiltrated the Northeastern part of Sabah. The invaders identified themselves as Royal Security Forces of Sultanate of Sulu and North Borneo, and occupied a village called Tanduo (Figure 3) in Lahad Datu, Sabah (Zachariah, 2013). The Sulu Sultan Jamalul Kiram III confirmed that the invasion was led by his brother, Crown Prince Abgimuddin Kiram, and had instructions to proclaim their ancestral right over the disputed Sabah (Chooi, 2013a). They claimed they did not intend to initiate any hostilities, unless forced to use arms in self-defense. The intruders did not harm the villagers and allowed them to leave the troubled area peacefully (Chooi, 2013a).

Figure 3. Tanduo village (from Aziz, 2013).

This was the first incident of external armed forces invading Malaysia since the Ganyang Malaysia (crush Malaysia) campaign by Indonesia in 1965. The area was besieged by Malaysian Security Forces led by the Inspector General of Police, and backed by other agencies such as the Malaysian Armed Forces, and Malaysian Coast Guard. The intruders were offered by the Malaysian government to leave Malaysian soil peacefully by February 27, 2013 (Poling et al., 2013). Despite the request from the Philippine government and several extensions in the deadline given by the Malaysian government, the intruders held their ground in Tanduo. While the intruders held their ground, this incident caused some social distress among the Lahad Datu population, the exchange of cyber-attacks between Malaysian and Philippine citizens (as the invaders were Philippine citizens), concern for the safety of Philippine immigrant workers, and a disturbance in domestic business in Malaysia ("Lahad Datu Invasion," 2013).

The standoff lasted for nearly three weeks. On March 1, 2013, the first gunfire was exchanged killing twelve intruders and two Malaysian Police Commandos. Moreover, an ambush on police in Lahad Datu village resulted in the death of eight

policemen and six Tausugs. On March 5, 2013, the Malaysian prime minister announced the commencement of Ops Sulu-Daulat, which was essentially the green light for a military assault on the besieged red zone of Kampung Tanduo ("Ops Sulu Bermula," 2013). During the campaign, Malaysian security forces had mobilized 5610 troops, fighter jets, helicopters, mortars, and armored personnel carriers (Kamavoz, 2013). The operation was officially ended on March 15, 2013, with Malaysian losses amounting to ten security personnel killed and a financial cost of almost RM85 million (Zakariah, 2013). Meanwhile, the intruders' losses were 68 dead and 173 arrested (Kamavoz, 2013).

This research explored PESTEL analysis, game theory, and the Analytical Hierarchical Process to assess the decision process of the Malaysian government in responding to the Lahad-Datu standoff in 2013. AHP provided the structural framework for subjective assessment and quantification of the subjective analysis (Saaty, 1990). In support of AHP, the criteria for the decision making were based on an environmental approach analysis—PESTEL analysis. Media reports and other relevant literature were collected and analyzed based on Political, Economic, Social, Technological, Environment and Legal (PESTEL) attributes that highlighted the critical criteria that affected both parties' payoff in the game theory (Said, 2002; Yuksel, 2012). By using the game theory model, each party was potentially assessed by a particular set of criteria independent from other party's criteria which led to a more suitable, precise and transparent criteria. The game theory model also provided the opportunity to assess each rational player with the influence of his opponent's possible strategy (Straffin, 1993). The result helped us in better understanding the dynamics behind the Malaysian prime minister's decision to use force in Ops Sulu-Daulat. This decision-making model demonstrated the viability of combined PESTEL, AHP, and game theory application in deciding a course of action in any conflict.

B. PURPOSE AND OBJECTIVES OF THE RESEARCH

The purpose of this research is to demonstrate the viability of the combined application of three decision-making tools—PESTEL, AHP and game theory—to provide the framework for an effective decision-making model.

The objectives of this research are as follows:

1. To demonstrate the viability of the combined application of PESTEL, AHP, and game theory as a model of decision making in any conflict.

2. To explore the probable justification of the Malaysian government's decision to forcefully respond to the invasion of Sabah by the non-state actors.

C. RESEARCH QUESTIONS AND HYPOTHESES

The research was driven by the following questions:

1. Can PESTEL analysis, AHP, and game theory be effectively fused to propose a viable decision-making framework?

2. Can this proposed model help us better comprehend the dynamics behind the decision-making process of the Malaysian prime minister in this crisis?

3. Could the Malaysian government avoid use of force and amicably resolve the conflict by peaceful means?

4. Could the intruders avoid use of force in the given scenario?

Based on these research questions, the thesis intends to test the following hypotheses:

1. H1: PESTEL analysis, AHP, and game theory can be effectively fused to propose a viable decision-making framework.

2. H2: This proposed model can help us to better comprehend the dynamics behind the decision-making process of the Malaysian prime minister in this crisis.

3. H3: Malaysian government could not avoid the use of force.

4. H4: The invaders could not avoid use of force in the given scenario.

D. SCOPE AND LIMITATIONS

The scope and limitations of this study are as follows:

1. For purpose of simplicity, we considered two key players in this case study: the Prime Minister of Malaysia (Prime Minister), and Sultan Jamalul Kiram III (Sultan Sulu). While the PESTEL analysis considered a number of internal and external actors—which directly or indirectly

influenced these players—the game theoretical part evaluated the interaction between the key players only.

2. The decision-making timeframe is during the negotiation period, and not later than February 27, 2013.

3. Both players' strategies were constrained by a number of factors. While the sultan wanted to internationalize and highlight the outstanding sultan's claim of Sabah, the Malaysian government has been pursuing a no-negotiation policy—both with the sultan and the Philippine government. Moreover, there is no clear representation of Suluk people with there being more than one claimant to the title of Sultan Sulu The strategy is only focused on actions after the negotiation period offered by the Malaysian government to the intruders ended. With these constraints in mind, the strategies are limited as shown in Table 1.

Players	Strategies
Prime Minister of Malaysia	1. Besiege the area and continue the negotiations to convince the intruders to leave Sabah peacefully.
	2. Assault by security forces, and arrest the intruders.
Sultan Jamalul Kiram III's Sultan Sulu	1. Surrender unconditionally, and leave for Sulu peacefully.
	2. Dig in and fight.

Table 1. Both players' strategies.

E. RESEARCH DESIGN

A combination of game theory, AHP, and PESTEL analysis were employed to analyze the Malaysian Prime Minister's decision-making process against the intruders. Game theory is a useful tool in analyzing interactive decision-making process, but lacks in credibility in assigning payoffs or quantitative representation of judgment (Said, 2002). AHP is incorporated to compensate the Game theory's weaknesses, as AHP is well known as a credible tool that could offer a quantification unit and translate qualitative criteria into a quantitative judgment (Ishizaka et al., 2011). We further enhanced our accuracy in this research by employing PESTEL analysis to complement the AHP criteria. PESTEL analysis provides the macro environmental framework in structuring our search for the criteria of decision making (Bensoussan and Fleisher, 2008). An overview of the research design is shown in Figure 4.

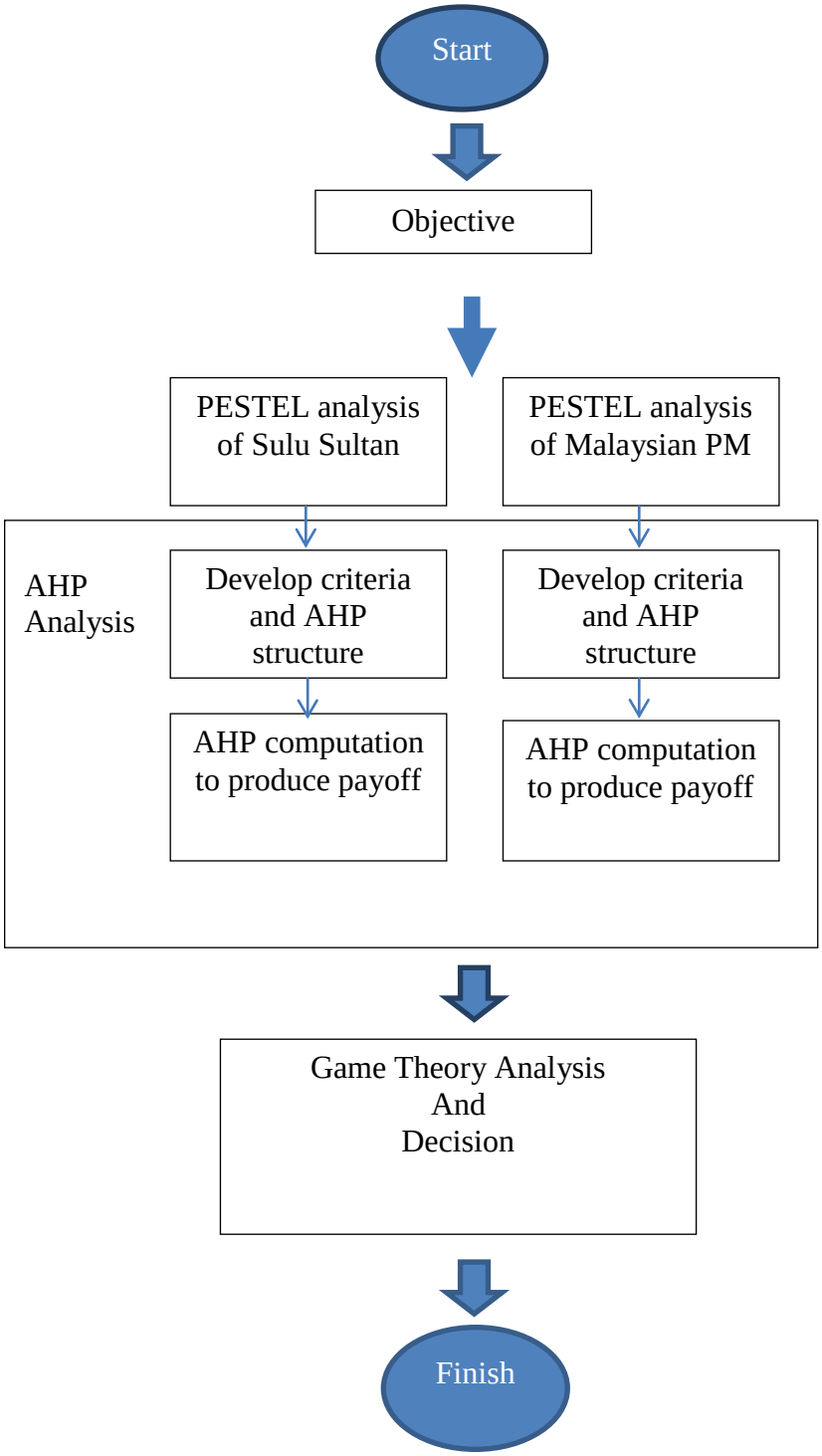

Figure 4. Research design flowchart.

F. METHODOLOGY

The research began by identifying the decision-making objective for both players. The objective of this decision-making process was to select the best course of action for both players to resolve the conflict. PESTEL model analysis was conducted to understand the situation comprehensively to support the decision-making process. In this research, PESTEL analysis procedures were adapted from the steps suggested by Bensoussan and Fleisher (2008, pp. 175–179). Table 2 shows the PESTEL analysis steps employed in this research.

Steps	Details
1	Defining the general scope of individual PESTEL elements
2	Selecting events to be analyzed
3	Relating the event to the issue
4	Forecasting the impact of the event on the issue
5	Clustering events as decision criteria

Table 2. PESTEL analysis framework.

In our research, the first step was to provide an overview of the general scope of individual PESTEL elements. The second step was to identify relevant issues and events that could impact the objective of decision making. Relevant data was collected from open sources like newspapers, magazines and other publications of the time, as nothing confidential was available from official sources. This helped us to narrow down the general scope to specific events that we could take into account. In essence, this was a stricter definition of boundaries considering the conjectural nature of analysis. For example, the whole political analysis was segmented into domestic, regional, and global political spheres. Domestic politics were further limited to the upcoming general elections, as all political matters, in the mind of the prime minister, cannot be objectively accounted for. In the third step, these relevant issues or events were analyzed to justify their relevance on the players' judgment. For example, the prime minister's political stakes in the elections made the elections a relevant consideration for any decision making in this case study. The fourth step was analyzing the impact of these events on

the Lahad-Datu crisis. The last step was to catalog the events into possible concern criteria that could influence the decision-making process of the players. The decision criteria developed in PESTEL model analysis were used as the basis of decision criteria development in AHP analysis.

Table 3 displays the steps in AHP model analysis adapted from Moore & Weatherford (2001), and the software developed by Fox (2013). The AHP analysis started by structuring the decision-making process with the identified objective and formulation of decision criteria based on the PESTEL analysis, followed by development of weight of criterion and local weight of alternate, or COA, and synthesis ranking by the usage of an Excel program developed by Professor Fox (Fox, 2013). Fox's Excel program is validated by entering the same relative preference for each criterion with an intensity of one, which gives the same payoff result for each criterion with an overall sum of 1 (e.g., for four criteria/alternates, each should have a payoff or weight of 0.25). The result was the global weight of payoff for each criterion. These payoffs were later used as outcome payoffs of both players in the game theory analysis. A sensitivity analysis was also carried out to observe the ability of the model to manage to an "if" input. This was done by changing different possible degrees of variables in AHP analysis, which subsequently could alter the payoff in game theory.

Steps	Details
1	Structuring the decision-making process. • Identifying objectives • Formulating decision criteria (data provided from PESTEL analysis) • Formulating sub decision making criteria (if required)
2	Developing weight for each criterion by software. • Developing matrix of pair-wise relative preference and intensity • Consistency measurement • Normalization
3	Developing local weight for each alternate by software. • Developing matrix of pair-wise relative preference and intensity • Consistency measurement • Normalization
4	Synthesis Ranking by software. Calculating global weight (multiplying respective local weight within the same decision criteria)

Table 3. AHP analysis framework.

After completing the AHP process, the payoffs were keyed into the game theory analysis shown in Table 4. This model is based on Professor Giordano's (2013) DA 4410 class on modeling using game theory, and software developed by Feix (2007). Players are already determined from the start of the process, which are the Prime Minister of Malaysia (as Prime Minister) and Sultan Jamalul Kiram III (as Sultan Sulu). The payoffs for outcomes were provided from the AHP and keyed into the Feix software. As the payoff generated from the AHP model is an interval scaling (cardinal values), the research focuses on non-zero sum solution by utilizing Partial Sum Strategic Moves, security level and Nash Arbitration to analyze the best strategy to be adopted by both players. Partial Sum Strategic Moves provide the analysis in step 4 in the game theory model; meanwhile, step 6 provides security level and Nash Arbitration payoffs (as shown in Table 4).

Steps	Actions
1	Determine players
2	Determine their strategies
3	Determine payoffs for conjecture outcome (input from AHP model)
4	Analysis (if applicable) • Likely outcome (conservative maximin) without communication • Pure strategy Nash Equilibrium • Maximin (conservative) Pure strategy • Strategic Move
5	If total conflict games (constant sum/zero sum): may be resolved by using mixed strategy solution
6	If partial conflict games (non-zero sum): may be resolved by arbitration, • Security level • Nash Arbitration

Table 4. Game theory framework.

G. THESIS ORGANIZATION

This thesis is organized into six chapters. Chapter I is the introduction consisting of the problem statement, purpose, objective, scope and significance of the study, research question, and research design framework. Chapter II focuses on the literature review of the concerned decision-making tools. Chapter III contains the PESTEL analysis and discussion. Chapter IV contains AHP analysis and discussion. Chapter V contains the game theory analysis and discussion. Chapter VI is the conclusion of the thesis, containing a review of our findings, as well as suggestions for additional applications and further research on the proposed combined decision-making methodology.

This chapter has identified the problem statement, purpose, objectives, scope, and significance of this research. It has also laid out the framework for this research and the organization of the thesis. Chapter II covers a detailed literature review of PESTEL, AHP and game theory.

II. LITERATURE REVIEW

This chapter examines the literature on the decision-making tools employed in this research. The focus of this chapter is to provide academic background for the proposed decision-making model.

A. DECISION-MAKING TOOLS FOR RESOLVING CONFLICT

"Conflict is strategic interaction; the actions of both sides determine whether war occurs, and actors in international crises choose their actions in part for the anticipated effect of those actions on others" (Morrow, 1997, p. 11). Morrow (1997) asserts that game theory is the appropriate tool to understand conflict. Game theory was introduced by Von Neumann and Morgenstern in 1944 as the science of interactive decision making (Zagare and Slantchez, 2009). It is a rational and logical analysis of situations of conflict (Straffin, 1993). Straffin (1993) further explains that the parameters of the game are as follows:

1. There must be at least two players in the game. These could be persons, organizations, nations or a system.
2. Each player must have more than one strategy to choose from.
3. The strategy chosen will determine the outcome of the game.
4. The outcome is associated with numerical payoffs as values to the outcome.

Myerson (1991) stated that game theory assumes that the players are rational and intelligent. The player should make a decision that maximizes his expected output utility. The player is also intelligent in the sense that he knows about the operation of the game (Myerson, 1991, pp. 3–5). Zagare and Slantchez (2009) suggested that there are three conceptual devices used in the conflict literature to capture the strategic structure of a game. The concepts are as elucidated as follows:

1. A game tree is used to represent a game in the extensive form. This is typically used in the analysis of two, and sometimes, three-person games.

2. A payoff matrix is the basis of the normal or strategic form of representation. It is typically used in the analysis of two, and sometimes, three-person games.

3. A mathematical function that assigns a payoff to every player and to every combination of players is known as the characteristic function of representation. The form is most frequently encountered when an n-person game is under consideration.

The idea of game theory is to provide the decision maker the best solution to resolve a conflict. In a non-zero-sum, game three main interactions are considered to produce the solution, when there is no communication between both players; when there is interaction with communication that involves commitment, promise, and threat; and arbitration between both players to resolve to have a fair game (Straffin, 1993, p. 65).

The basic setup of a non-zero-sum game matrix of 2x2 is depicted in Figure 5 (Straffin, 1993). In this example, two players, Rose and Colin, are entangled in a conflict. Both players have two strategies each. Interactions of both players produce four outcomes. These outcomes are represented by payoff values as shown in Figure 5. The higher value means higher payoff. Payoff for Rose is the first value for each box and the second value is for Colin. For example, in Outcome 1, value 2 is Rose's outcome and value 3 is Colin's outcome. In this game, each player will maximize his outcome as a response to the other player's strategy. Rose will move vertically, as shown by blue arrows (e.g., Payoff 1 moves to payoff 2 or payoff 0 moves to payoff 3) and Colin will move laterally, as shown by red arrows (e.g., Payoff 0 moves to payoff 1 or payoff 2 moves to payoff 3). The example in Figure 6 also shows that both players have a dominant strategy where both players have only one preferred strategy in response to other player's strategy. In this example, Nash Equilibrium is achieved at box Outcome 3 (3, 3) because it has only incoming arrows (Straffin, 1993, p. 66).

		Colin		
		Strategy 1		Strategy 2
Rose	Strategy 1	Outcome 1		Outcome 3
	Strategy 2	Outcome 2		Outcome 4

Figure 5. Non-zero-sum-game 2 x 2 matrix setup.

		Colin		
		Strategy 1		Strategy 2
Rose	Strategy 1	2,2		3,3
				
	Strategy 2	1,0		0,1

Figure 6. Example of 2 x 2 Non-zero-sum-game matrix.

Non-zero-sum game also accommodates for the cooperative game of arbitration. Nash arbitration will be based on Nash's axioms which are rationality, linear invariance, symmetry, and invariance. The main objective of the arbitration game is to achieve fairness (Straffin, 1993). Any solution for arbitration game should be Pareto optimal and at or above the security level for both players (Straffin, 1993, p. 103). Security level is the safest payoff for the player to engage with arbitration. The game will proceed by playing each player's payoffs separately. The player whose payoffs are being analyzed will maximize his payoff while the opponent minimizes the other player's outcome. As a result, a status quo (SQ) and negotiation set for arbitration will be produced for both players to achieve fairness (Straffin, 1993, pp. 103–107).

Game theory has weaknesses in allocating payoffs. Said (2002) reported that even though game theory offers a useful approach to the framework of interactive decision making in strategic problems, priority should be given in the estimation of the payoffs, especially when the problems are dominated by qualitative considerations. Game theory cannot directly allocate a quantitative pay off for qualitative criteria. Said's study shows that AHP can be used to mitigate the payoffs' discrepancy in game theory. AHP can provide the quantitative payoffs for game theory (Said, 2002).

B. ANALYTICAL HIERARCHICAL PROCESS (AHP)

AHP, developed by Thomas L. Saaty, an operations researcher, is a methodology for structuring complexity, measurement, and synthesis. It is based on a mathematical structure of consistent matrices and their associated eigenvector's ability to generate true or approximate weight (Saaty, 1990). Saaty (1990, p. 23) states that the benefits of AHP are as follows:

1. Unity: easily understood and flexible
2. Complexity: Integrates deductive and systems approaches in solving complex problems
3. Interdependence: deals with interdependence of elements and does not insist on linear thinking
4. Hierarchical Structuring: Inherent natural tendency of human thinking
5. Measurement: Provides a scale for measuring intangibles and establishing priorities
6. Consistency: Tracks logical judgments in determining priorities
7. Synthesis: Leads to overall estimates of each player's alternative
8. Tradeoffs: Considerations of relative priorities of factors in a system
9. Judgment and consensus: Synthesizes outcomes from diverse judgments, not just consensus
10. Process Repetition: Enables people to refine and improve judgment through repetitions

AHP is chosen in a situation that requires structuring, measurement and synthesis. It was used to resolve problems of choice in a multi-criteria or multi-objective environment which involves qualitative and quantitate factors (Forman and Gass, 2001;

Babu & Sharma, 2005). Ishizaka et al. (2011) also suggested that AHP is an adequate support decision tool in many decision problems and, especially, problems incorporating a dominant criterion. Forman and Gass (2001) reported that AHP has gained acceptance by many academicians and practitioners, but it has also opened numerous academic discourses and debates. Most of the debates have been about AHP axioms, principals, transitivity, and rank reversal (Warren, 2004). All of this notwithstanding, wide usage of AHP in numerous fields has validated AHP as an acceptable decision-making tool.

Numerous papers reported that many organizations, such as government agencies, hospitals, military, universities, and the private sector, have benefited from AHP as a decision tool. They used it in highway projects, fishery and forestry management, air traffic system, marine research, the medical and healthcare fields, the telecommunication industry, benchmarking, quality management, public policy, defense, strategic planning, and supplier and product selection (Forman and Gass, 2001; Muralidran, et al., 2002; Cebi and Bayraktar, 2003; Ishizaka et al., 2011).

AHP principles are governed by four axioms. The first is the *reciprocal axiom*, which states that if an objective or alternate A is five times more important than B, B then has one-fifth the importance relative to A. The second is the *homogeneity axiom*. The third is the *synthesis axiom*, which states that the priorities of an element do not depend on a lower-level element in a hierarchy. The fourth is that individuals who have reasons for their beliefs should make sure that their ideas are adequately represented for the outcome to match the expectations (Forman and Gass, 2001).

Basic principles of AHP are the foundation of this technique to solve complex problems. They are decomposed by hierarchical structuring, comparative judgment by ratio scale measurements, logical consistency, and synthesis of priority (Saaty, 1990; Babu & Sharma, 2005). The summary of the AHP framework is shown in Table 5.

Steps	Details
1	Identify objective.
2	Identify criteria for evaluation.
3	Decompose criteria to sub-criteria (if required).
4	Develop weight for each criterion. • Matrix of pair-wise relative preference and intensity • Consistency measurement • Normalization
5	Develop local weight for each alternate. • Matrix of pair-wise relative preference and intensity • Consistency measurement • Normalization
6.	Synthesis Ranking • Calculate global weight (Multiplying respective local weight within the same decision criteria)

Table 5. AHP Framework

Hierarchical structuring is known as the most powerful method of classification by the human brain in ordering experience, observation, entities, and information. An organization will intuitively choose the hierarchical form when facing a complex problem-solving situation, and when communicating power among organizational members (Saaty, 1990). A problem is broken down into a hierarchy in order to capture its basic elements. General information is broken downward to the next level of criteria for more specific information. AHP uses this principle in breaking up objectives to levels of specific criteria, where the bottom level is the alternative from whatever choice is to be made (Babu & Sharma, 2005).

Figure 7 shows the hierarchy of evaluation and selection of two alternatives with two criteria. The *Objective level* contains the objective of the evaluation. The Level 1has three criteria to be evaluated, which is Political, Cost and Social; and the *alternative level* has two decision alternatives namely Alternative 1 and Alternative 2 for each criterion to be evaluated in respect to criteria in level 1.

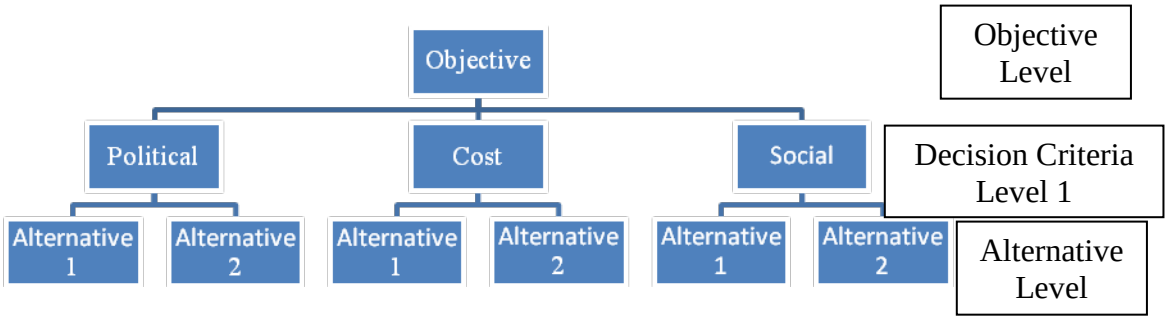

Figure 7. Hierarchical structure of selection.

There are four types of measurement scales, *nominal*, *ordinal*, *interval*, and *ratio* (Saaty, 1990). These scales are arranged in ascending order where the latter has the properties of the scale before it. *Ratio* scale is the most dominant, as it has the properties of all scales. Saaty (1990) used pairwise comparison to derive preference to the local *ratio* scale that is used as local weight or ranking priorities with respect to their parent. *Ratio* scale is used in all levels of the hierarchy, including the alternative level. Forman and Gass (2001) argued that *ratio* scale, produced by AHP, had to make AHP more powerful than other methodologies using *ordinal* and *interval* measures. Table 6 shows the measurement scale of numerical rating and verbal judgment used in AHP.

Measurement Scale		
Numerical Rating	Verbal Judgment of Preference/Relative Importance	Explanation
9	A is Extremely Preferred over B	The judgment in favor of one activity over another is of the highest possible order of affirmation.
7	Very Strongly Preferred	Conclusive judgment as to the importance of one activity over another.
5	Strongly Preferred	The judgment is to strongly favor one activity over another.
3	Moderately Preferred	The judgment is to favor one activity over another, but it is not conclusive.
1	Equally Preferred	Two activities contribute equally to the objective.
2, 4, 6, 8	Intermediate values between the two adjacent judgments	When compromise is needed.
Reciprocal of above non zero numbers	If activity *i* has one of the above non zero numbers assigned to it when compared to activity *j*, then *j* has the reciprocal value when compared with *i*.	

Table 6. Ratio scale of AHP (from Saaty, 1990).

Originally, comparison was done by using eigenvector (Saaty, 1990). Today, calculation for comparison, normalized value, and consistency are done by using a spreadsheet program (Fox, 2014; Moore & Weatherford, 2001). Two tables will be assigned for each criterion vs. criterion and each alternative vs. each alternative by criterion. They are the *Comparison Matrix* and *Normalized Matrix*.

The basic procedure for comparison is as follows:

1. Developing a pairwise comparison matrix for every criterion with respect to their parent in every level.
2. Normalizing the resulting matrix.
3. Averaging the values in each row to get the corresponding rating.
4. Calculating and checking the consistency ratio.

Table 7 shows an example of a comparison matrix of three criteria. In the comparison matrix, criteria will be evaluated based on the relative importance or preference between two criteria. The measurement scale is using *ratio* scale as shown in

Table 8. In this example, the Political (row) is two times more preferred when compared to the Cost (column). Reciprocally, the Cost (row) is two times less preferred than the Political (column).

	Political	Cost	Social
Political	**1**	2	3
Cost	1/2	**1**	2
Social	1/3	1/2	**1**

Table 7. Pairwise matrix (after Saaty, 1990).

The consistency of the pairwise matrix or Consistency Ratio (CR) will be determined through the software. Table 8 shows an example of the consistency ratio outcome from the software. The CR should be below 0.10 for the comparison in the matrix to be considered consistent.

λ	3.00311567
CI	0.00155784
RI	0.52
CR=	0.00299584
	consistent

Table 8. The Consistency Ratio result.

After completing the pairwise activity, a sum of the scores for each column is then transferred to the normalized matrix to calculate the average value for each criterion. This process will be automatically done by the software. Table 9 shows an example of the average value of each criterion calculated by the software.

Eigenvector Criterion Weights	
Political	0.545
Cost	0.287
Social	0.168

Table 9. Average value of the criterion.

Synthesis allows us to rank alternatives by producing total average or global weight. These are achieved by multiplying the respective local weights of each level with global weight with respect to their parent element (Moore & Weatherford, 2001).

Figure 8 shows an example of local weight for three alternatives with three criteria. For example, the weight for Political is 0.545 and the weight for Alternative 1 under the Political criterion is 0.545. The calculation of global weight for this decision making hierarchy of Figure 8 is depicted in Table 10. For example, the global weight for Alternative 1 is 0.465 from the sum of 0.297 + 0.144 + 0.024. In this example, Alternative 1 was ranked in first position followed by Alternative 2 and Alternative 3. For the purpose of this thesis, the global weight will be used as payoff in the game theory.

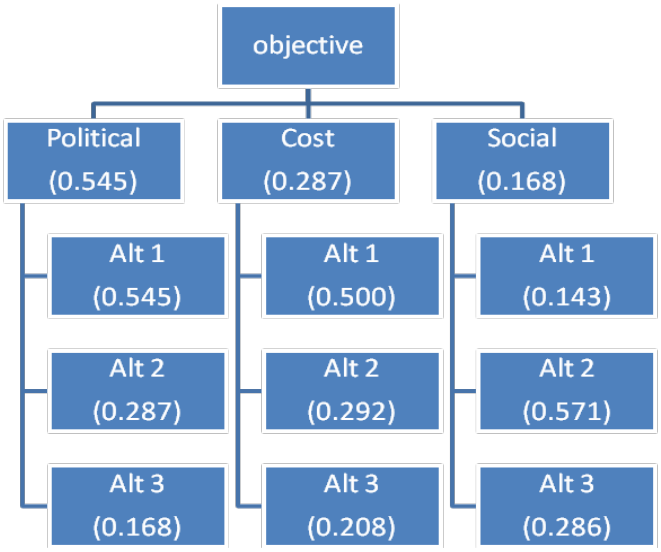

Figure 8. Structure for criteria and decision alternative.

Criterion	Weight	Decision Alternative Alternative 1		Decision Alternate Alternative 2		Decision Alternative Alternative 3	
		Local weight	Multiply (b xc)	Local weight	Multiply (b x e)	Local weight	Multiply (b x g)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Political	0.545	0.545	0.297	0.287	0.156	0.168	0.092
Cost	0.287	0.500	0.144	0.292	0.084	0.208	0.060
Social	0.168	0.143	0.024	0.571	0.096	0.286	0.048
Global weight			0.465		0.336		0.200
Ranking			1		2		3

Table 10. Summary of global weight in synthesis of rating.

C. PESTEL ANALYSIS

PESTEL analysis is a variant of PEST (Political, Economic, Social, and Technology) and is similar to SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis that provides a framework for understanding the environmental factors that could impact associated decisions. PESTEL provides a framework of analysis that addresses issues of a political, economic, socio-cultural, technological, environmental, and legal nature (Bensoussan & Fleisher, 2008, pp. 169–171).

Although this type of analysis is commonly used in business and marketing strategy decision making, the framework could also be used for identifying and organizing issues (Holcombe & Johnston, 2008, pp. 37–58). Holcombe and Johnston (2008) report using PESTEL in their analysis on The Planning, Programming, and Budgeting (PPB) system to satisfy the nation's policy objective. The weaknesses in PESTEL analysis are that PESTEL lacks a measurement and evaluation dimension (Yuksel, 2012). Yuksel (2012) suggested that AHP can be used to quantify the PESTEL analysis. The fusion works both ways. At the same time, PESTEL analysis provides a defined scope of analysis for the AHP model, which would also be the scope for the whole framework of the research.

Bensoussan and Fleisher (2008, pp. 175–179) suggested that PESTEL analysis should start with the definition of environmental boundary, followed by five processes in addressing each segment of PESTEL, which include:

1. Understand the key events and trends of the segment in reference to the issue.
2. Understand the relation of trend.
3. Relate trend to issue.
4. Forecast future direction of events or trends.
5. Derive implication of the events or trends to organization—negative, positive or neutral impacts.

This chapter has briefly discussed the theories underlying the selected decision-making tools. It also highlighted the strengths and weaknesses of each tool, in addition to highlighting the possibility and logic of jointly using these tools to mitigate the weaknesses of each. Chapter III will explain the employment of these tools by combining them into a model. The idea is that game theory can be supplemented by AHP by providing payoffs; meanwhile, PESTEL analysis can be used to provide scope and criteria for the AHP decision-making model. These tools complement each other in order to provide an effective decision-making framework.

III. PESTEL MODEL ANALYSES

This chapter explains the PESTEL analysis of the two players in this case study, and focuses on the prime minister's and sultan's macro environment. PESTEL analysis involves looking at political, economic, social, technological, environmental and legal factors influencing the two players. The focus is to produce main concerns of each player during this crisis.

A. PESTEL ANALYSIS OF THE MALAYSIAN PRIME MINISTER'S CONCERNS

Overall, as the following analyses reveal, the Prime Minister of Malaysia faced the greatest challenges from domestic demands and reactions to his decisions. While he had the support of the international community, he had to consider how his decisions would impact upcoming elections and Malaysia's relationship with its regional neighbors, particularly the Philippines. Furthermore, he had to consider the economic consequences of escalation, a prolonged conflict, relief efforts for refugees and the impact of the conflict on eco-tourism.

1. Political Analysis

The political considerations for the prime minister can be subdivided into domestic, regional and global political factors. The most prominent event in Malaysia's domestic politics during the Sulu intrusion was the upcoming thirteenth general elections. The government, led by Prime Minister Najib Abd Razak, was yet to confirm the date for the elections (Muis et al., 2012). Prime Minister Najib Abd Razak had to dissolve parliament on April 28, 2013 and hold the general elections within 60 days (Kate & Porter, 2013). The elections were expected be the most fiercely contested in Malaysian history. The previous general elections in 2008 had shown a new trend of the electorate, which had not been witnessed by Malaysians since 1959 (Nehru & Tran, 2013). In the twelfth general elections, the present ruling party, Barisan National or National Front (BN)—a coalition of numerous mainstream parties in Peninsular Malaysia, Sabah and Sarawak—led by Prime Minister Abdullah Ahmad Badawi, was challenged by the first

significant opposition coalition, Pakatan Rakyat or People's Coalition comprised of Parti Keadilan Rakyat or People's Justice Party, Parti Islam Malaysia or Malaysian Islamic Party and Parti Tindakan Demokratik or Democratic Action Party, led by the former deputy prime minister of Malaysia, Anwar Ibrahim. Astonishingly, BN lost its two-thirds parliamentary majority in the national legislature, and thus its power to amend the constitution, as well as five of thirteen state elections (Muis et al., 2012; Nehru & Tran, 2013). Interestingly, Nehru and Tran (2013) reported that even though BN won the general elections and Najib Tun Razak formed the government based on a first-past-the-post electoral system, PR won 47 percent of the popular vote. Figure 9 shows the popular vote percentage of opposition gained in three consecutive general elections (Nehru & Tran, 2013). It shows that the opposition alliance had increased their popular vote in the previous general elections. This development was a real threat to the ruling party.

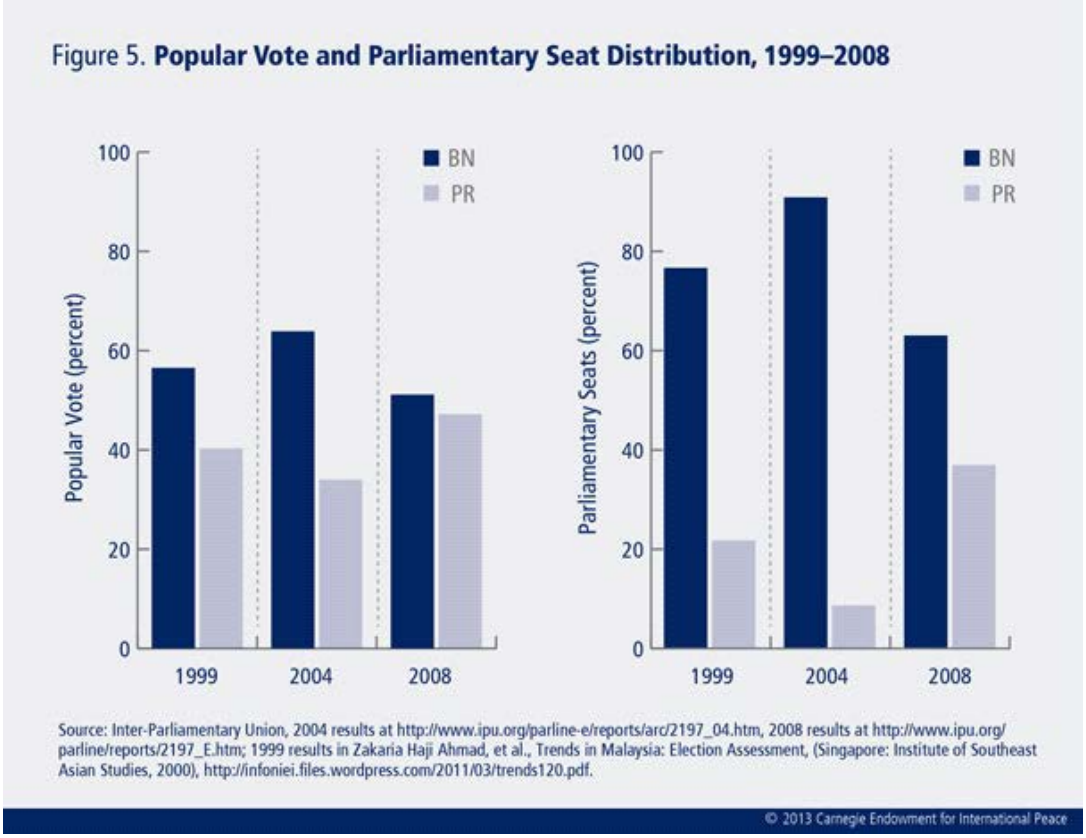

Figure 9. The popular vote (from Nehru & Tran, 2013)

The consensus among many political commentators appeared to be that BN's majority was going to be eroded further in the 2013 elections due to a variety of national issues, such as Malay domination, the rise in the cost of living, government transparency, and efficiency (Nehru & Tran, 2013). Under the Najib administration, Nehru and Tran (2013) reported that Prime Minister Najib Razak's approval rating remained above 60 percent, but the BN coalition was less popular, with an approval rating of 45 percent, due to allegations of corruption and cronyism. Lamb (2013) observed that in a Merdeka poll, young Malaysian voters aged 21 to 30 were also unhappy with the prime minister's performance. This was alarming for the governing coalition, as out of 13.3 million registered voters in the thirteenth general elections, almost a quarter were under the age of 25, with more than 3 million Malaysians voting for the first time (Lamb, 2013). Furthermore, Muis et al. (2012) reported that PR succeeded in maintaining the popular momentum when it won eight out of 13 small elections after the twelfth general elections. The government's image was further tarnished by Malaysia's ranking in Transparency International's Corruption Perception Index, which saw Malaysia slip steadily over the years from 25 in 1995 to 56 in 2013 (Nehru & Tran, 2013). Moreover, a Global Witness report on land grabs in the state of Sarawak highlighted the systemic corruption that appears to permeate all levels of government in Malaysia, and the Royal Commission Inquiry (RCI) on the illegal award of national identity cards to immigrants (especially to Filipinos) had significantly damaged the government's reputation and efforts at reformation (Nehru & Tran, 2013). The RCI issue was critical to Malaysians as the allegations could expose the reality of transparency in the Sabah electoral process as the government was accused of manipulating the identification card award system in order to win the 2008 elections (Kate & Porter, 2013).

Throughout the Sulu crisis, all Malaysians including the opposition parties unanimously supported the government's action against intruders of Malaysian sovereignty ("After 15 Days," 2013). Amid the show of solidarity in this crisis, both the government and opposition parties accused each other of sponsoring the intruders or getting political mileage from the situation. Opposition parties accused the government of staging the crisis as they thought the government had staged the 1999 al Mauna

incident—which also occurred just before the previous general elections—in order to divert the people's attention away from the RCI and Amalillio scandal ("Armed Filipino," 2013). For its part, the government accused the opposition parties of being involved in the Sulu crisis with an aim to make the government coalition partner (UMNO) lose the Sabah vote ("It's a Plot," 2013). Figure 10 reveals that the government alliance had strong support in Sabah in the 2008 general elections (Nehru & Tran, 2013).

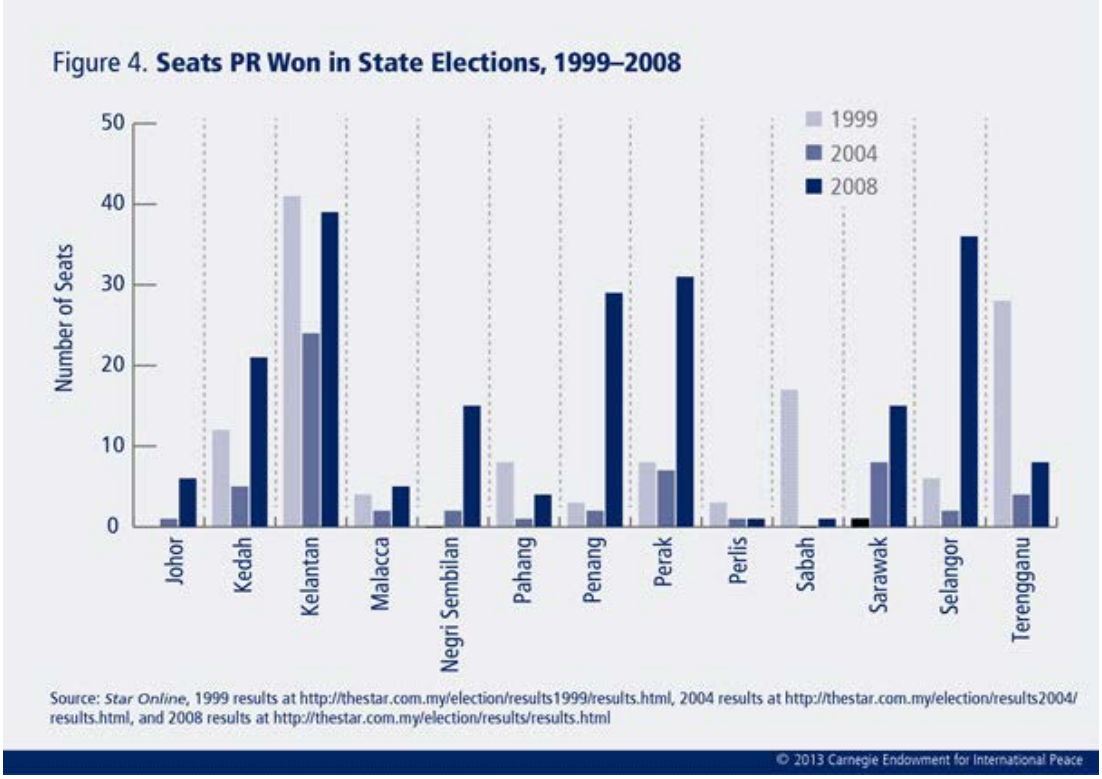

Figure 10. State election seats won by the opposition alliance (from Nehru & Tran, 2013).

The government alliance was troubled that this incident could affect support from the Sabah population. Rumors circulated that Prime Minister Najib even wanted to use this issue as a justification to postpone the thirteenth general elections. Opposition parties also blamed the prime minister for weak leadership in handling the conflict, especially after Malaysian security forces suffered casualties (Kate & Porter, 2013). Government supporters argued that this was highly unlikely because the government would not have

liked to delay the elections at a time when its popularity was falling. Furthermore, the government could benefit from the conflict because if the government was successful in driving out the invaders, it could boost the ruling coalition's chances in the elections. Even if the fighting continued, people might have rallied around the government as a show of solidarity in a time of crisis (Poling et al., 2013). Nevertheless, pressure built up on the government as the public was frustrated by the fact that Filipino gunmen infiltrated Sabah so easily. This reinforced the suspicion that Sabah's immigration and security policies are intentionally lax to allow for easy election-rigging, as suggested by the RCI on illegal immigrants (Kate & Porter, 2013).

Meanwhile, on the regional political front, general elections were also to be held in the Philippines on May 13. Mindanao had 11.4 million voters which made up a quarter of the Philippine's total voters (Kate & Porter, 2013). Any unpopular move by the Philippine government in handling this crisis could cost them the election. Nevertheless, the Philippine President had shown his commitment to cooperate with the Malaysian government by urging the sultan to withdraw his men from Sabah peacefully. He also threatened to take stern action against the intruders and hold the sultan responsible for the incursion (Poling et al., 2013). Furthermore, the Philippine government was unlikely to interfere in Malaysia's internal affairs as both states are members of the Treaty of Amity and Cooperation in Southeast Asia, which aims to "promote perpetual peace, everlasting amity and cooperation among their peoples, which would contribute to their strength, solidarity, and closer relationship." Article 2 of the Treaty stipulates the consensus of the contracting parties to respect territory and national sovereignty and the right to repulse the external interference, subversion or coercion. Article 13 stipulates that all contracting parties shall refrain from use of force to settle disputes but seek friendly negotiations ("Treaty of Amity," 2014).

The acting Autonomous Region in Muslim Mindanao (ARMM) Governor Mujiv Hataman, Tawi-Tawi Governor Badikul Sahali; Sulu Governor Abdusakur Tan; Maguindanao Governor Ismael Mangudadatu; Basilan Governor Jum Akbar; and Lanao del Sur Governor Mamintal Adiong, Jr. issued a statement in a press conference in Greenhills, San Juan, Monday to urge the intruders to leave Sabah in peace. Even though

they honored the right of the Sultanate to claim Sabah, they urged the Sultanate to adhere to international rules and protocol in pursuing its claim. They also raised the concern over the fate of thousands of Filipinos who had earned their living peacefully over the years and who might be caught up in the conflict ("ARMM Governors," 2013).

Other important players in the region are the Moro Islamic Liberation Front (MILF) and Moro National Liberation Front (MNLF). MILF and MNLF are the main separatist groups in the south of Mindanao that fight for Mindanao liberation from the Philippines. Originally they were in the same group, but in 1996 MILF separated from MNLF because of the formation of ARMM. MILF viewed ARMM as a sign of submission to the government of the Philippines. Former leader and founder of MNLF and former Governor of the ARMM Government in 1996–2002, Misuari, had sworn to join the fight if the Malaysian government decided to launch an assault against the intruders. Back in 2002, Misuari was accused of killing 100 people in the MNLF attack of Army headquarters in Jolo, Sulu. As a fugitive he was captured by Malaysian security forces in Sabah and extradited to the Philippines ("Nur Misuari as ARMM," 2013). Contrary to Misuari's threat, the present leader of MNLF, Muslimin Sema, disapproved of the intrusion and had ordered his men not to interfere in the crisis ("MNLF Condemns," 2013).

Both MNLF and MILF leadership had declared that the crisis should be settled by Malaysian and Philippine authorities and they would not interfere in the crisis (Chooi, 2013a). MILF, which is the biggest separatist group in Mindanao, is also involved in the Bangsamoro Peace Treaty negotiations with the Philippine government. These negotiations were championed by the Malaysian government to end the armed conflict in Mindanao. This treaty is to replace the ARMM government that has been established in 1996. The Bangsamoro Peace Treaty aims to strengthen the ARMM and promote peace in Mindanao (Chooi, 2013a; "Nur Misuari as ARMM," 2013). MILF believed that the treaty was too valuable to be jeopardized by the crisis (Poling et al., 2013). At the same time, Sultan Kiram and Misuari were known to oppose the treaty negotiations as they felt sidelined, especially on the claim of Sabah status (Kate & Porter, 2013). Both of them were accused of staging the standoff to derail the Bangsamoro Peace Agreement (Chooi,

2013). Pitlo (2013) argued that the incident was a form of protest against Malaysian involvement in the Bangsamoro Peace Agreement in which Malaysia had a crucial self-interest, especially in the Sabah claim by the Sultanate of Sulu and Government of the Philippines. He also reported that MNLF fighters could easily penetrate Sabah because the long coastline of Sabah presented a natural challenge to the Malaysian coastal patrol and the MNLF's fighters were familiar with the area as they once received their training in Sabah under Malaysian sponsorship after the disclosure of Philippine's Operation Merdeka, and Jabidah massacre in 1967. In such a situation, the chances of any material support from MNLF, MILF or the Philippine government were very bleak (Pitlo, 2013).

Sultan Sulu also requested the United States of America, Organization of Islamic Cooperation and United Nations to intervene in the crisis. The Sultan urged the U.S. to honor the 1915 Kiram-Carpenter Agreement, which concluded that the "U.S. colonial government will provide full protection to the Sultan of Sulu should the question of Sabah arise in the future between the Sultanate and any foreign authority." The U.S. ambassador to the Philippines rejected the request and believed that the Malaysian government had the credibility and legitimacy to settle the problem (Chooi, 2013b). Meanwhile, the Organization of Islamic Cooperation did not make any comment on this issue and the UN Secretary-General Ban Ki-moon only issued a statement that requested all parties to uphold international human rights standards and seek a peaceful resolution ("OIC, UN," 2013 and Quismundo, 2013). In general, the international community did not have any issue with Malaysia taking action against the armed intruders, as it was seen as an act to defend her sovereignty. But there was much concern in Malaysia about possible human rights violations, free media access and the disproportionate use of force over a small number of intruders (Pitlo, 2013).

2. Economic Analysis

Sabah, which has economic importance for Malaysia, had been doing well economically before this crisis. The Chief Minister of Sabah claimed that Sabah's economic growth during 2007 through 2012 was fairly high, with an annual growth rate of 4.7 percent, compared to the national annual growth rate of 4.3 percent ("Opening

Remarks," 2013). Oxford Business Review also reported that the local agency RAM Rating reaffirmed the AAA rating of the state government's bond for a fourth consecutive year. Between January and September 2012, the state saw investment of RM 4.8 billion, which was the second highest among Malaysian states ("Economy Update Sabah" (2013). Sabah also made RM 16.75 billion worth of palm oil exports and is regarded as the world's third largest producer of palm oil ("Opening Remarks," 2013). Borneo Post Online reported that investment in Palm Oil Industrial Cluster (POIC) in Lahad Datu alone reached RM 4.5 billion and creates 2,238 jobs ("Lahad Datu POIC," 2012). Lahad Datu is also considered as a potential top tourism attraction as it offers eco-tourism, and local products based on marine, forestry, and agriculture. Lahad Datu hosts Ulu Segama Malua Forest Reserve where rare species of flora and fauna, such as the Borneo Pygmy Elephant, Borneo Sumatran Rhinoceros, Orang Utan and wild orchid, are found, and Tabin Wildlife Park which has a mud volcano. Lahad Datu also offers beautiful islands and favorite destinations for scuba divers, such as Pulau Mabul and Pulau Perhentian (Noordin, 2012). The apparent economic potential of Sabah makes it all the more important for the Malaysian government to uphold her right over Sabah, and the effort shown in developing the state is the testimony of the Malaysian government's interest and determination.

The crisis could adversely affect Sabah's, and in turn, the Malaysian economy. The Star Online reported that Malaysian Rating Corp Berhad's chief economist Nor Zahidi Alias believed that the crisis initially affected local businesses such as retail and tourism, but it could hit the Malaysian economy if the crisis escalated and was prolonged. Local businesses, tourism, fishing, and palm oil plantation activities within the hot zone, were most affected by the crisis as Malaysian security forces cordoned off the area from land and sea ("Lahad Datu Invasion," 2013).

Internal refugees were an economic burden and there were human displacement costs. Even providing relief to the affected people was taxing the Malaysian economy. Besides sanitation, husbandry and medical care, according to Berita Harian Online, the Malaysian Civil Defence Force (JPAM) commander Kolonel Abdul Wahab Rahim said

that they spent RM 30,000 for food for three days in two relocation centres ("Ops Daulat JPAM," 2013).

The cost of mobilization of forces also had its impact on the Malaysian economy. In a Parliament session, Datuk Seri Hisyammudin, the Defense Minister, said that 5610 security personnel were deployed and RM 84.9 million were spent (Izwan, 2013). As a result, if the crisis continued to linger on, it could adversely affect the economy, increase the anxiety of the affected people, and seriously dent public support for the government coalition in the coming general elections, especially in Sabah constituencies.

3. Social Analysis

The Sabah Department of Statistics Director told the RCI that, according to the 2010 census, there were 889,000 foreigners in Sabah, which comprised 28 percent of its population (Su-Lyn, 2013). Sabah is home to many ethnicities having roots in Mindanao, including the Suluk or Tausug and the family of the Sultanate, who are citizens of Malaysia. Poling et al., 2013 reported that there are about 800,000 Filipinos living and working in Sabah and many of them are poor and undocumented. Utusan online reported that the Secretary of Rumpun Etnik Suluk Sabah, or the Sabah Suluk Ethnic Cluster, Mohd Zaki Harry Susanto, claimed there were more than 300,000 Suluk in Malaysia registered with the Jabatan Pendaftaran Negara or State Registration Department ("Suluk Sabah," 2013).

Mohd Zaki also expressed that the provocation by the sultan was uncalled for and uncivilized. He believed that most Suluk living in Sabah support the Malaysian government and their allegiance is to the Yang Dipertuan Agung, Head of Malaysia. He claimed that his people had also participated in the creation of Malaysia and their most celebrated leaders in the event were Tun Datu Mustapha who was the first Head of State and former Chief Minister of Sabah, and at present, Yang Dipertuan Negeri or the head of the Sabah state, Tun Juhar Mahirudin ("Suluk Sabah," 2013; Luping, 2011).

There are indications that some members of the royal family of Sulu also disapproved of the intruders' action. This was natural considering the many factions within the family. Suara Islam reported that in an interview with Habib Muhammad

Rizieq bin Husein Syihab, the grand mufti elected by Sultan Bantilan Mu'izzudin II explained that in the past Sultan Sulu had been inherited from the descendants of Sultan Azimuddin I and his brother Sultan Badaruddin I ("Filipina di Balik," 2013). In 1962, Sultan Ismail Kiram I, the descendant of Sultan Azimuddin I, was recognized as the official Sultan of Sulu by the Philippine government. Later, he signed an agreement transferring the right of Sabah and Sulu to the Philippine government. The present Sultan of Sulu, Jamalul Kiram III, is the descendant of Sultan Ismail Kiram I, but at the same time Sulu has another sultan from the descendants of Sultan Mu'izzuddin I—Sultan Bantilan Mu'izzudin II. Habib Muhammad Rizieq claimed that Sultan Bantilan is the true Sultan of Sulu because he was elected through the consensus of Datus, Syarifs, scholars, prominent figures and the people of Sulu at the Rumah Bicara conference. Unlike Sultan Kiram, Sultan Bantilan disapproved of the agreement with the Philippine and Sabah claim status. During the crisis, the grand mufti and other representatives of Sultan Bantilan held a meeting with the Malaysian Defense Minister to resolve the crisis. The representatives also expressed Sultan Bantilan's views about Malaysia, which he considered as a good brother Muslim country that had always helped the Sulu people in the past ("Filipina di Balik," 2013).

Apparently, the majority of residents in Sabah, including the Suluk, disapproved of the incursion on Sabah by the Tausug. So, no material support could be expected by the intruders from the Sabah residents. However, any wrong move by the security forces against ethnic Suluk and Philippine immigrants could be seen as persecution, which could jeopardize the government's chances of winning in the coming elections. Even worse, improper social handling of the issue could muster support for the intruders.

4. Technological Analysis

The Malaysian security forces' strength was far superior to that of the intruders in terms of numbers and weaponry. It was reported that the intruders were equipped with rifles only (Chooi, 2013a; Kamavoz, 2013). Nevertheless, the Malaysian security forces' challenge was to prepare for escalation of the crisis. It was imperative to react with the appropriate level of force to confront the uncertainty of escalation. The Malaysian

government had also mobilized civil defense assets, such as the Jabatan Pertahanan Awam Malaysia (JPAM) or Malaysia Civil Defense Department, to take care of the civilians involved. Mainly these civilians were the 1,520 villagers of Kampung Tanduo, Tanjung Labian, Sungai Bilis, Tanagian, Sungai Merah, Lok Buani and Sinakut. They had taken refuge in public halls such as Embara Budi, Cendrawasih, Gemala Putra and Fajar Harapan in Felda Sahabat 16 for their security, and for easy access to the relief delivery system ("Ops Daulat JPAM," 2013; "Kenyataan Media," 2013). JPAM coordinated the relief efforts by providing cooked food, basic sanitary facilities, medical facilities, public security, information and counselling ("Kenyataan Media," 2013).

The Malaysian government also mobilized the mobile information unit to relay security directives to the public through loudspeakers. The Department of Information also set up a media center for representatives to access information on the crisis, and for holding government media conferences. On the whole, there was no considerable worry for the prime minister in the realm of technology.

5. Environmental Analysis

The area of Felda Sahabat is a palm oil plantation area owned by the government agency, Felda ("Stay Away," 2013). Any environmental degradation caused by the military operation could affect the palm oil exports of Malaysia. Moreover, there were also chances of the eco-tourism being adversely affected in the case of a large scale military operation.

6. Legal Analysis

The public was concerned with the government's decision to negotiate with the intruders to leave peacefully, as they wanted them to be brought to justice according to Malaysian law. The Malaysian law mandates death sentence for crimes of murder, treason, robbery with firearms, terrorism-related offences and possession of fire arms (Koshy, 2013). In a somewhat similar incident in the year 2000, nineteen people from the al Ma'unah cult posed as army officers to steal more than 100 rifles and ammunition. In the process two security forces personnel were killed. These criminals were later convicted under the Malaysian Penal Code for waging war against the King or Head of

State (Yang Dipertuan Agung). Three of them were sentenced to death ("Death Penalty," 2001).

In 2012, Malaysia passed the bill of Security Offences (Special Measures) Act (SOSMA) to repeal the Internal Security Act of 1960. SOSMA is aligned with the Penal Code, Criminal Procedure Code and Evidence Act of 1950, which covered offences against state and offences related to terrorism (Aingkaran Kugathasan, 2013). The Inspector of Police had also announced that the intruders would be investigated under the Securities Offenses (Special Measures) Act and Section 130(c) of the Penal Code concerning acts of terrorism, Malaysiakini reported ("IGP," 2013). This created a disincentive for the intruders to lay down their arms as they feared a death sentence from the Malaysian legal system.

As discussed earlier, the global and regional players and institutions had no legal issues with Malaysia taking action against the intruders. So, the prime minister did not face any tangible concern in this regard. However, there was pressure on him from the populace to bring the intruders to justice.

B. PESTEL ANALYSIS OF SULTAN SULU'S CONCERNS

In the following analyses, the focus is on the key factors that would impact the sultan's decisions. These are primarily the political and economic factors, and to a lesser degree, the legal consequences of invading Lahad Datu. The Malaysian security forces' equipment was far superior to that of his men. The intruders were only equipped with rifles and small firearms (Chooi, 2013a). So, the sultan had no technological considerations during this crisis. Similarly, environmental concerns did not influence his decision making.

1. Political Analysis

The Sulu Sultan claimed that the Sabah is the Sultanate of Sulu's inheritance. He maintained that the main purpose of the crisis was to claim the ancestral land that rightly belonged to the Sultanate. This claim had been a dormant claim made by the Philippines over Malaysia based on the Sultanate of Sulu's heritage which is part of present day

Philippines. In 1962, Sultan Ismail Kiram I, the forefather of Sultan Jamalul Kiram III, was recognized as the official Sultan of Sulu by the Philippine government. Later he signed an agreement transferring the right of Sabah and Sulu to the Philippine government ("Sultanate of Sulu," n.d.) and "Filipina di Balik," 2013). After the failed attempt to destabilize Malaysia in Operation Merdeka that ended with the Jabadiah massacre and diplomatic retaliation from Malaysia, President Marcos decided not to press the Philippines' claim on Sabah in order to restore regional stability. Sultan Jamalul Kiram III denounced the Philippine government's decision and blocked the move legislatively (Abd Samad, 2013).

In the past, the Sulu sultanate had been inherited from the descendant of Sultan Azimuddin I and his brother, Sultan Badaruddin I. In 1962 Sultan Ismail Kiram I, who was a descendant of Sultan Azimuddin I, was recognized as the official Sultan of Sulu by the Philippine government and transferred the right of Sabah and Sulu to the Philippine government. At present there is no official sultan of Sulu. Besides Sultan Jamalul Kiram III, who was the descendant of Sultan Ismail Kiram I, there are other royal family members of Sulu who have claimed to be the rightful Sultan of Sulu, such as Sultan Muhammad Fuad Abdulla Kiram I and Sultan Bantilan Mu'izzudin. Sultan Muhammad Fuad is the descendant of Sultan Ismail Kiram I, and Sultan Bantilan Mu'izzudin II is the descendant of Sultan Mu'izzuddin I ("Sultanate of Sulu," n.d. and "Filipina di Balik," 2013). Sultan Bantilan declared himself the true Sultan of Sulu because he was elected through the consensus of Datus, Syarifs, scholars, prominent figures and the peoples of Sulu at the Rumah Bicara conference. Unlike Sultan Jamalul Kiram I, Sultan Bantilan disapproved of the agreement with the Philippine and Sabah claim status and disapproved of the incursion on Lahad Datu. ("Filipina di Balik," 2013).

Malaysia has maintained her right to Sabah based on the Cessation Agreement of 1878 between the British North Borneo Company and the Sultanate of Brunei and Sulu, and the right of the residents of Sabah to exercise their self-determination when they voted to join the Federation of Malaysia in 1969 (Poling et al., 2013). On the hand, the Sultanate of Sulu views the cessation as a temporary rental as the Malaysian government continues to pay the family equivalent to 5300.00 Mexican pesos annually. He also

demands that Malaysia should increase the rent amount to at least 10 percent of Sabah's GDP or return Sabah to the Sulu people (Medina and Cayabyah, 2013; Poling et al., 2013 and "Sabah is an issue," n.d.).

In a recent development, the Philippine government has entered into a peace arrangement with the largest group of Islamic separatists (MILF) to end the conflict with Bangsamoro on the Mindanao Island. This initiative was brokered by Malaysia. On October 15, 2012, the Government of the Philippines and MILF signed the Framework of Agreement on the Bangsamoro at Malacanag Palace ("The 2012 Framework," 2012). Nevertheless, Sultan Jamalul Kiram III (Sulu Sultan) claimed that this agreement had sidelined the Sultanate of Sulu's interests, especially the ancestral claims on the Kingdom of Sulu covering the whole archipelago of Sulu, which includes Sulu, Basilan, Tawi-tawi, Zamboanga and Palawan; and the claim over Sabah. The Bangsamoro Peace Agreement between MILF and the Philippine government had diminished Sultan Sulu's status to political non-entity (Fabella, 2013; Lapena, 2013).

In this crisis, the only political ally that supported the Sultan Jamalul Kiram III was Nur Misouri, who is a former leader of MNLF. He was a former governor of ARMM during Arroyo's administration, and threatened to send his fighters in support of intruders if Malaysia decided to resort to aggression. By contrast, other main MNLF leaders did not support the sultan's intrusion in Sabah (Chooi, 2013a).

On the whole, the political considerations of re-claiming the right of Sabah, to internationalize the issue and to be included in the Bangsamoro Peace Agreement weighed heavily on the sultan's mind.

2. Economic Analysis

The Bangsamoro Peace Agreement had sidelined the sultan, and the Philippine government negotiated with MILF for a settlement of Mindanao. Mindanao is economically important; as government of Philippines has prioritized government's infrastructure budget over other region (Standard Chartered Global Research, 2013). So, the sultan feared considerable prospective economical loss when he was taken out of the equation. At the same time, the sultan demanded an increase in rental payment for Sabah

from Malaysia based on Sabah's GDP. On the whole, these two economic factors heavily influenced the sultan during this crisis.

3. Social Analysis

There are many Suluk people (Tausug) living in Sabah, including the families of the Sultanate of Sulu, and around 800,000 Filipinos, who are basically labourer in the palm oil industry. Among the social fallout of this crisis could be their forced deportation, as many of them are poor and undocumented (Poling et al., 2013). On one hand, the sultan wanted to gain politically in the eyes of Tausugs; on the other hand, he could lose their support if they lost their livelihoods because of his intruders. Nonetheless, the immigrant population in Malaysia was not a particular concern for the Sultan.

4. Legal Analysis

The claim of Sabah had been transferred to the Philippines based on the agreement between Sultan Ismail Kiram I and the Philippine government in 1962 (Filipina di balik, 2013); however, since President Marcos's administration, the government of the Philippines had not pursued the matter. Sultan Jamalul Kiram has been persistent about his right to Sabah. During this crisis, the Philippine authorities warned the sultan of prosecution for violating the Philippine law with the invasion of Lahad Datu (Poling et al., 2013). The government of the Philippines had also sent a naval ship on a humanitarian mission to pick up the intruders if the intruders agreed to leave peacefully (Poling et al., 2013). Malaysia had urged the intruders to leave Sabah peacefully or face Malaysian law for invading Sabah with force. Although the sultan feared legal consequences both from Malaysia and the Philippines, his political, economic and social concerns eclipsed this factor.

C. RESULT OF PESTEL ANALYSIS

In the following sections the previously discussed factors are mapped to their potential events and corresponding effects. This information is considered in terms of their influence on the players' judgment.

1. Influences on the Prime Minister of Malaysia

The identified events or issues were further analyzed for their effect on the crisis. Table 11 shows the possible events and their effects on the prime minister's judgment during the crisis.

	• **Events/Issues**	• **Affects**
• Political	• Domestic pressure to take stern action against the intruders. • Domestic pressure due to allegations of staging the crisis to distract public attention from the scandals, especially RCI on mismanagement of identification cards issue in Sabah. • Domestic pressure due to falling popular support because of government's poor performance. • Domestic pressure to dissolve the Parliament for the general election. • Detrimental support for government alliance party after general election. • Credibility as a respected Muslim state. • Malaysian role in Bangsamoro Framework Agreement. • No apparent regional or international disapproval.	• Delay in taking stern action could make the government vulnerable to allegations of staging the crisis or failing to defend the state sovereignty. Subsequently, it could adversely affect the ruling coalition's public support in general elections. Conversely, taking strong action could boost the government's position in the upcoming elections. • If action of the Malaysian government was perceived as not based on spirit of Islamic brotherhood, it could jeopardize the Bangsamoro Framework Agreement (due to adverse reaction, especially from the Moro people). The failure of this framework could also affect Malaysian interests in Sabah.

	• **Events/Issues**	• **Affects**
• Economic	• Local unrest could adversely affect local economy. • Financial and casualty costs of the crisis	• The longer the crisis, the higher the financial burden on the government. Locals getting affected could adversely affect the government's performance in the upcoming elections.
• Social	• Very low possibility of Sabah residents, including immigrants, supporting the intruders. • Possible local unrest due to security forces' highhandedness.	• High probability of Sabah residents' supporting to Malaysian government. • Any unpopular preventive action by the security forces could affect ruling coalition's vote bank in the elections.
• Technological	• Military and technological power was superior. • Asymmetric conflict. • Aiding affected local people • Reduce adverse impact to government in general election. • Cost involved in security forces and civil defense operations, financial and human casualties.	• Failure to care for the welfare of the displaced population could affect ruling coalition's vote bank in the elections. • Overreaction of Malaysian security forces could harm Malaysian reputation as a respected Muslim state.
• Environmental	• Compensation cost	• Failure to compensate the loss could affect ruling coalition's vote bank in the elections.
• Legal	• Malaysian penal code	• Failure to take legal action on the intruders could be seen as weakness of the government in handling this attack on Malaysian sovereignty. • Allegation of staging the crisis.

Table 11. Possible effects of events on the Malaysian Prime Minister.

Based on the analysis of events and effects in Table 11, the Malaysian prime minister could have considered that an external threat such as MNLF, MILF and the Philippines had a very low probability of actively supporting the Sultan of Sulu's men. Even local residents, including the Suluk and Filipinos, had a low probability of actively supporting the intruders. It was clear that the intruders with their smagll weapons were no match for the Malaysian forces. The Malaysian prime minister could have read that the international community had a high probability of not supporting this action by non-state actors aimed at destabilizing the region. Overall, his main concerns are short listed and clustered as in the following.

1. **Political survival in the elections**. The thirteenth general elections were to be the first in which Dato' Seri Najib was leading the Barisan National as leader of the coalition. The opposition parties had gained tremendous support from the Malaysian voters since the twelfth general election. Meanwhile, the Barisan National had been criticized on a number of issues; and the Merdeka poll showed that the government was disliked particularly by the young voters. The public demanded an explanation on how a handful of intruders could challenge Malaysian sovereignty, and why the government was too cautious in taking a strong action against them. This crisis had to be solved tactfully by the prime minister as any wrong move could politically cost him dearly. On the other hand, popular and bold handling could provide him the critical voter support he badly needed at this stage.

2. **Cost to Malaysia**. The crisis had caused the government to spend on troop mobilization, humanitarian aid to the displaced population, setbacks in tourism and disturbance in local economy—especially the palm oil plantations, and refinery production and development programs. The longer the crisis dragged on, the higher the financial cost to the national exchequer would be. Besides monetary cost, friendly casualties or collateral damage could also politically cost the prime minister. Any escalation could affect local immigrants. Any resultant civil unrest could have adverse effects on local economy. Moreover, any further mobilization of resources to deal with civil unrest would also cost financially.

3. **Social unrest**. Lahad Datu holds quite a large number of ethnic Suluk and Filipino immigrants. Preparation to prevent an escalation could cause a deterrence trap as the move could be misinterpreted as persecution of Filipinos. Furthermore, the social unrest could adversely affect the government's popularity.

4. **Malaysian credibility**. Malaysia had brokered the Bangsamoro Framework Agreement as a contribution to regional stability. Malaysia is respected by other Muslim countries due to its tolerance and compassion on Muslim political issues around the world. It was important that this crisis did not jeopardize the Malaysian reputation which could adversely affect the support from the Muslim community in Mindanao for the peace arrangement. Failure of this framework could adversely affect Malaysian interests in Sabah.

2. Influences on Sultan Sulu

It is clear that Sultan Sulu's main concern is the survival of the sultanate itself. Table 12 shows the possible events and their effect on Sultan Sulu's judgment in resolving the crisis.

	Events/Issues	**Affects**
Political	• Sidelined in Bangsamoro Framework Agreement. • Reviving the ancestral claim over Sabah.	• Possibility of losing authority and right to ancestral kingdom of Sulu to MILF and Philippine government. • Increased dilemma for Malaysian PM's decision making by getting favorable statements from Misuari. • Internationalizing the Sabah issue and reasserting Sultan of Sulu's authority over Sabah.
Economic	• Sabah quit rent increment.	• Losing the privilege as the sole recipient of Sabah quit rent.
Social	• Assistance from local Suluk in Sabah.	• Increased cost to Malaysian government.
Technology	• Small arms for self-defense.	• Adverse effect on the safety of his men.
Environmental	• None	• None
Legal	• Ancestral right to Sabah.	• International recognition; and pressure on Malaysia to re-open negotiations on the issue.

Table 12. Possible effects of events on Sultan Sulu.

The main objective of the incursion was to have Malaysia and other international actors recognize Sultan Sulu's ancestral right to the Kingdom of Sulu and North Borneo. Analysis of events and effects suggests that the possibility of the intruders achieving a military victory were very slim, but Sultan Sulu had his own concerns. The concerns were as follows.

1. **Inclusion in Bangsamoro Framework Agreement**. Sultan was very concerned that the authority over the ancestral kingdom of Sulu and North Borneo was to be turned over to MILF. His royal family house would lose its political leverage and economic perks. Furthermore, the framework had sidelined the issue of Sabah which had been his passion. He hoped that the incursion would persuade the Bangsamoro Framework Agreement committee to consider his interests seriously; and he would also be a player in the Agreement.

2. **Safety of the intruders**. He sent his brother, the crown prince, to lead the mission. He was trying to highlight the seriousness of his message. At the same time, having the crown prince among the intruders could make Malaysia hesitant to employ kinetic means against the intruders. Even though he repeatedly said that the intruders would not leave Sabah, he also kept up his efforts to discredit the Malaysian forces by accusations of their using disproportionate force against his men. He also believed that he could count on Misuari's support.

3. **Revive the Sabah claim**. The signing of the Bangsamoro Framework Agreement could mean that the Kiram royal house would lose authority over its ancestral kingdom of Sulu, and Sabah's rental money. Malaysia did not want to negotiate over the dispute of Sabah and raise the Sabah quit rent. By pursuing this desperate move, he thought that the issue of Sabah could be revived to his advantage by attracting international attention.

D. CHAPTER CONCLUSION

The chapter has identified the main concerns of the two players in the Lahad Datu crisis. The Prime Minister of Malaysia had four main concerns, while the Sultan of Sulu had three. These concerns are to be fed into AHP analysis to produce a qualitative representation of and relative degree of concern toward different issues in order to seek the solution to end the crisis.

IV. AHP MODEL ANALYSIS

This chapter analyzes the main concerns of the two players of this case study. These concerns were provided by the PESTEL analysis in Chapter III. The focus of this chapter is to produce global weights for alternatives in AHP analysis and hence payoffs for both players in Game Theory. The following sections cover in detail the four steps involving AHP analysis.

A. STRUCTURING THE DECISION-MAKING PROCESS

The first step of this analysis is to formulate objectives for both players. The decision is assumed to be made by both players after Malaysian security forces besieged the intruders and before the date given for voluntary surrender expired. The objective of each player in this decision making situation was to choose the most preferable strategy to solve the crisis to his maximum benefit. Both players are assumed to have only two strategies each. As per conjecture, the Malaysian Prime Minister either had to persuade the intruders to leave Sabah peacefully (*Negotiation)*, or to disarm the intruders by force and prosecute them in accordance with Malaysian law (*Assault)*. Meanwhile, Sultan Sulu had a choice of either ordering the intruders to stay put and fight (*Fight)*, or accepting the offer to leave Sabah peacefully (*Leave)*. At the same time, each player also took into consideration the other party's response in relation to their strategy as a game theory approach of a non-zero sum game. As a result of these interactions, each player had four probable outcomes generated from his chosen strategy which consequently become four alternatives (as their course of action) for each player to choose in AHP analysis. The four alternatives are labelled as Outcome 1 through Outcome 4. Outcome 1 means that the prime minister expected a certain outcome when he played the *Negotiation* strategy and expected Sultan Sulu to play the *Leave* strategy. Other alternatives' descriptions follow in Table 13, showing the summary of strategy options and alternative courses of action for both players. Table 14 shows the description of the strategies in this game.

		Sultan Jamalul Kiram III (Strategies)	
		Leave	Fight
Malaysian Prime Minister (Strategies)	Negotiation	Outcome 1	Outcome 3
	Assault	Outcome 2	Outcome 4

Table 13. Strategy interactions and possible alternatives for Lahad Datu crisis.

Strategy	Description
PM Negotiation	Besiege the area and continue the negotiations to convince the intruders to leave Sabah peacefully.
PM Assault	Assault by security forces, and arrest the intruders.
Sulu Leave	Surrender unconditionally, and leave for Sulu peacefully.
Sulu Fight	Dig in and fight.

Table 14. Description of strategies.

The next step is to establish decision criteria for both players. The decision criteria of each player were generated based on the associated PESTEL analysis carried out in Chapter III.

1. Decision Criteria of the Prime Minister

The decision criteria for Prime Minister are as follows:

1. Political survival in thirteenth general elections. Under this criterion, each alternative was evaluated in light of its potential political advantage or harm to the ruling coalition's success in the coming elections. The alternatives were ordered according to their potential for accruing maximum political mileage for the prime minister in the upcoming elections.

2. Cost to Malaysia. Under this criterion, each alternative was evaluated against four main considerations—duration of standoff, financial loss, adverse effects on local economy, and human casualties. Any alternative that was evaluated to present a relatively high probability of increased cost was considered as a relatively low preference and vice versa.

3. Local population's unrest. Under this criterion, each alternative was evaluated against its possible effect on the local population, including ethnic Suluk and Filipinos. These were both legal and illegal residents who were, in the case of a prolonged standoff, expected to go through additional hardships in their daily business, discrimination from the larger population of Malaysia; and were sitting on the fence wondering whether to support the government or intruders. Any alternative that was thought to present a relatively high probability of increasing unrest in the local population was rendered as a relatively low preference and vice versa.

4. Malaysia's credibility. Under this criterion, each alternative was evaluated against its possible effect on Malaysia's credibility as a leading Muslim state advocating Muslims' brotherhood. Moreover, taking action against fellow Muslims could also be detrimental to Mindanao Muslims' support of the Bangsamoro Framework Agreement. Any alternative that was evaluated to present a relatively high probability to tarnish Malaysia's image was rendered as a relatively low preference and vice versa.

2. Decision Criteria of Sultan Sulu

Decision criteria of Sultan Sulu are as follows:

1. To be included in Bangsamoro peace process. Under this consideration each alternative was evaluated against its effect on the probability of the sultan being included in the Bangsamoro Framework Agreement. He faced the risk of being reduced to a political non-entity. Moreover, his legitimacy was also being questioned by other claimants to his title. So, he expected through this crisis to be included in the agreement. Any alternative that was considered to present a relatively high probability was rendered as a relatively high preference and vice versa.

2. Safety of the intruders. Under this consideration, each alternative was evaluated against its effect on the safety of his men in Tanduo. Any alternative that was evaluated to present a relatively low probability for the safety of his men was rendered as a relatively low preference and vice versa.

3. Revive the Sabah claim. Under this consideration, each alternative was evaluated against its effect on the probability to revive the Sabah claim and extract acknowledgement from the Malaysian and Philippine governments as the rightful owner of the ancestral Kingdom of Sulu and North Borneo, and recipient of 'Sabah quit' rent. Any alternative that was evaluated to present a relatively high probability of achieving this objective was rendered as a relatively high preference and vice versa.

The next step was to structure the AHP decision-making process for both players. The hierarchy of the decision-making process for both belligerents is depicted in Figure 11 and Figure 12, respectively. Both hierarchies had one objective, one level of decision criteria (the prime minister has four decision criteria while Sultan Sulu has three) and four alternatives. The objective is to seek the best course of action (for self-interest) to solve the Lahad Datu crisis. The decision criteria for both players are as formulated in the previous paragraph of this section. While the alternatives are derived from both players' strategies discussed in the previous section of this chapter.

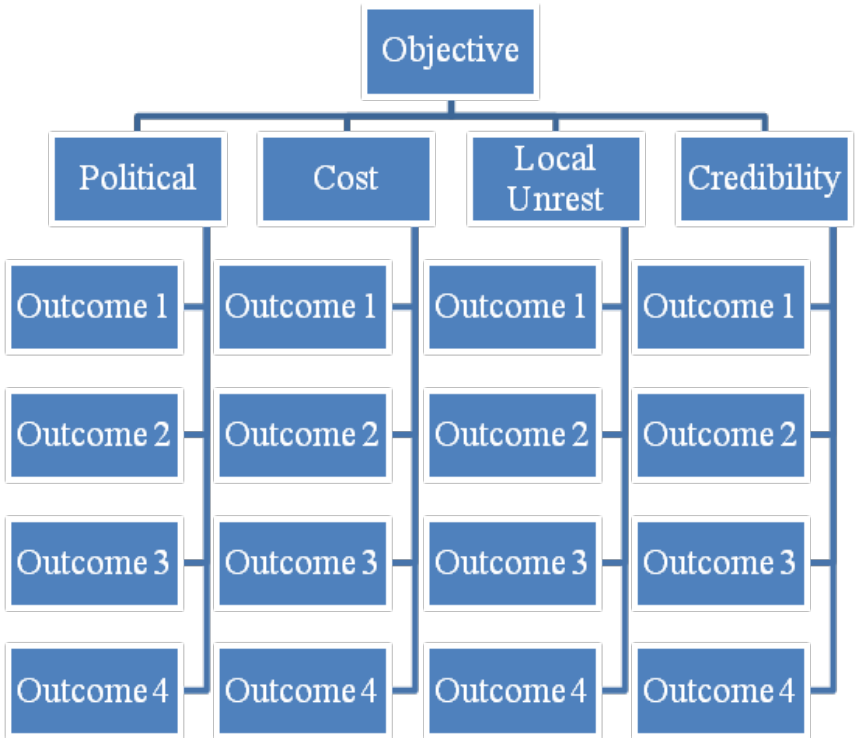

Figure 11. Prime minister's decision-making structure.

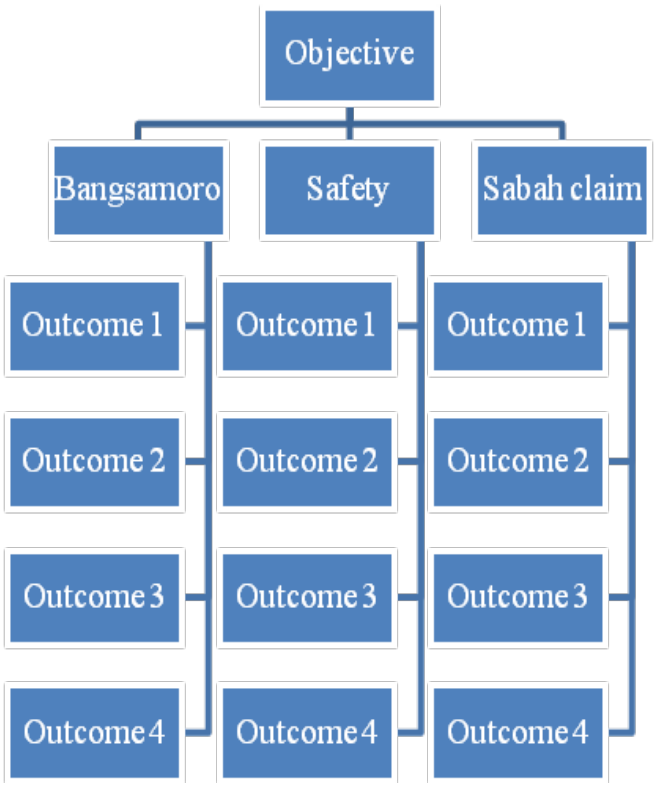

Figure 12. Sultan Sulu's decision-making structure.

B. COMPUTATION

This section will include the steps for developing weight and local weight for each criterion and synthesis ranking by software.

1. Computation of Malaysian Prime Minister's Decision Making

Having established the hierarchy of decision making, the process proceeded to allocate and compute the relative weight for each decision criterion to produce the best alternative and relative global weight.

a. Weights for Decision Criteria

Pairwise comparison was carried out as shown in Table 15, and the Consistency Ratio is shown in Table 16. The result in Table 17 provided the ranking of the criterion and its weight. Political survival had the highest importance to influence the decision-

making process of the prime minister with the weight of 559 x 10^{-3}, followed by social unrest (210 x 10^{-3}), credibility (135 x 10^{-3}), and cost (94 x 10^{-3}).

	Political Survival	Cost	Social unrest	Credibility
Political Survival	1	3	4	5
Cost	1/3	1	2	3
Social unrest	1/4	1/2	1	2
Credibility	1/5	1/3	1/2	1

Table 15. Pairwise decision criteria matrix.

λ	4.01595214
CI	0.00531738
RI	0.89
CR=	0.00597459
	consistent

Table 16. Consistency result.

Eigenvector Criterion Weights	
Political Survival	0.559546208
Cost	0.210062134
Social Unrest	0.13549172
Credibility	0.094899938

Table 17. Decision criteria weight.

b. Weights for Alternatives under Political Survival Criterion

Table 18 shows the probable alternative of employing a particular alternative. The probable alternative is generated through the understanding of PESTEL analysis provided in Chapter III. It provided guidelines to make the pairwise comparison in Table 19, and Consistency Ratio in Table 20. The result of local weight for each alternative under the political survival criterion is as shown in Table 21. Outcome 2 had the highest importance in influencing the decision-making process of the prime minister, followed by Outcome 4, Outcome 1 and Outcome 3. This means use of force against the intruders is perceived as having the most benefit to the government in terms of political survival of the government and its coalition partners in the upcoming thirteenth general elections.

Political Survival	**Probable Results**
Outcome 1	The prime minister risked looking weak if he extended his deadlines multiple times, which was expected to dent his coalition's vote bank in the coming elections. However, the Malaysian population expected the intruders to be brought to justice instead of being allowed to leave after having challenged the Malaysian sovereignty.
Outcome 2	Use of force was expected to boost his coalition's chances of winning the elections. Moreover, there was a public demand to act in accordance with the law.
Outcome 3	The public could accuse government of staging the crisis; and even worse there could be own troops' casualties.
Outcome 4	Although the prime minister would be acting as per the wishes of the masses, any possible troops' casualties which could cost him politically.

Table 18. Probable result of each alternative under Political Survival criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	1	¼	2	1/2
Outcome 2	4	1	5	2
Outcome 3	1/2	1/5	1	1/3
Outcome 4	2	½	3	1

Table 19. Pairwise matrix of each alternative under Political Survival criterion.

λ	4.00257
CI	0.00086
RI	0.89
CR=	0.00096
	consistent

Table 20. Consistency result.

Eigenvector Alternatives (Political Survival)	
Outcome 1	0.13444
Outcome 2	0.512505
Outcome 3	0.092594
Outcome 4	0.260461

Table 21. Weights of alternatives under Political Survival criterion.

c. Weights for Alternatives under Cost Criterion

Table 22 shows the probable result of employing a particular alternative. The probable result was generated through the understanding of PESTEL analysis provided in Chapter III. It provided guidelines for the pairwise comparison in Table 23. The consistency result is shown in Table 24. The result of the local weight for each alternative under the cost criterion is depicted in Table 25. Outcome 1 had the highest importance in influencing the decision-making process of the prime minister, followed by Outcome 2, Outcome 3 and Outcome 4. This means letting the intruders return peacefully without arresting them would cost the government the least financially and in terms of casualties.

Cost	Probable Results
Outcome 1	Least human and financial cost involved.
Outcome 2	Less chances of Malaysian casualties, but financial loss due to military operation.
Outcome 3	Increased financial cost due to prolonged siege; fair chances of Malaysian casualties if invaders attack.
Outcome 4	Highest financial cost as well as friendly casualties.

Table 22. Probable result of alternatives under Cost criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	**1**	2	4	5
Outcome 2	1/2	**1**	3	4
Outcome 3	1/4	1/3	**1**	2
Outcome 4	1/5	1/4	1/2	**1**

Table 23. Pairwise matrix of alternatives under Cost criterion.

λ	4.01169
CI	0.0039
RI	0.89
CR=	0.00438
	consistent

Table 24. Consistency result.

Eigenvector Alternatives (Cost Criterion)	
Outcome 1	0.512164
Outcome 2	0.281046
Outcome 3	0.12037
Outcome 4	0.08642

Table 25. Weight of alternatives under Cost criterion.

d. Weights for Alternatives under Local Unrest Criterion

Table 26 shows the probable alternative of employing a particular alternative under the Local Unrest criterion. The probable alternative was generated through the understanding of PESTEL analysis provided in Chapter III. It provided guidelines to make the pairwise comparison in Table 27. The consistency result of the pairwise comparison is shown in Table 28. The result of the local weight for each alternative under the Local Unrest criterion is shown in Table 29. Outcome 1 had the highest importance in influencing the decision-making process of the prime minister, followed by Outcome 2, Outcome 3 and Outcome 4. This implied that letting the intruders leave without taking legal action was to reduce the duration of the crisis, and thus reduce the magnitude of unrest in the local population.

Local Unrest	Probable Results
Outcome 1	Reduced duration of unrest. The best.
Outcome 2	Reduced duration of crisis, but could cause conflicting action between the two players, which could garner sympathy from the locals.
Outcome 3	Increased duration of unrest as security forces do not take any action to end the crisis.
Outcome 4	The highest increment of unrest for the locals.

Table 26. Probable result of alternatives under Local Unrest criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	**1**	2	3	4
Outcome 2	1/2	**1**	2	3
Outcome 3	1/3	1/2	**1**	2
Outcome 4	1/4	1/3	1/2	**1**

Table 27. Pairwise matrix for alternatives under Local Unrest criterion.

λ	4.00789
CI	0.00263
RI	0.89
CR=	0.00295
	consistent

Table 28. Consistency result.

Eigenvector Alternatives (Local Unrest)	
Outcome 1	0.479866
Outcome 2	0.262146
Outcome 3	0.155397
Outcome 4	0.102592

Table 29. Weight of alternatives under Local Unrest criterion.

e. Weights for Alternatives under Malaysian Credibility Criterion

Table 30 shows the probable result of employing particular decisions under the Malaysian Credibility criterion. The probable alternative is generated through the understanding of PESTEL analysis provided in Chapter III. It provided guidelines to make the pairwise comparison in Table 31. Its consistency result is shown in Table 32. The result of the local weight for each alternative under the Malaysian Credibility criterion is shown in Table 33. Outcome 1 had the highest importance in influencing the decision-making process of the prime minister, followed by Outcome 3, Outcome 4 and Outcome 2. This means that letting the intruders leave without any action against them, was expected to be more beneficial to Malaysian credibility, and good will among the Muslim population of Mindanao.

Credibility	Probable Results
Outcome 1	The best spirit of brotherhood shown by Malaysian government. Best for Malaysian credibility and good will.
Outcome 2	Assaulting and arresting the surrendering intruders would not be seen favorably by Muslims in the southern Philippines or local residents.
Outcome 3	Looks good to Mindanao Muslims as Malaysians refrain from aggression.
Outcome 4	Seen very unfavorable from Muslim brotherhood perspective.

Table 30. Probable result of alternatives under Malaysian Credibility criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	**1**	5	2	4
Outcome 2	1/5	**1**	1/3	1/2
Outcome 3	1/2	3	**1**	2
Outcome 4	1/4	2	1/2	**1**

Table 31. Pairwise matrix for alternatives under Malaysian Credibility criterion.

λ	4.00257
CI	0.00086
RI	0.89
CR=	0.00096
	consistent

Table 32. Consistency result.

Eigenvector Alternatives (Credibility)	
Outcome 1	0.512505
Outcome 2	0.092594
Outcome 3	0.260461
Outcome 4	0.13444

Table 33. Weight for alternatives under Malaysian Credibility criterion.

f. Global Weight or Payoff for Each Alternative

The decision criteria weights and local alternative weights were computed in the global weight matrix, which is shown in Table 34. The result in Table 35 shows that Outcome 2 would be the most preferred by the prime minister. The other alternatives in order of preference were Outcome 1, Outcome 4 and Outcome 3, respectively. The best course of action for the prime minister was to assault and arrest the intruders without any resistance from the intruders, who believed they could leave Malaysia peacefully without being brought to justice.

		4 x 4 Matrix			
	4 x 1 Matrix	Political	Cost	Local Unrest	Credibility
Political	0.559546	0.13444	0.512164	0.479865505	0.5125053
Cost	0.210062	0.512505	0.281046	0.262145561	0.0925937
Local Unrest	0.135492	0.092594	0.12037	0.155396998	0.2604615
Credibility	0.0949	0.260461	0.08642	0.102591936	0.1344395

Table 34. Global weight matrix.

Alternatives	Values
Outcome 1	0.29646594 (296.46594×10^{-3})
Outcome 2	0.39011316 (390.11316×10^{-3})
Outcome 3	0.1228685 (122.88685×10^{-3})
Outcome 4	0.1905524 (190.5524×10^{-3})

Table 35. Global weight of alternatives for prime minister.

2. Computation of Sultan Sulu's Decision Making

Having established the hierarchy of decision making, the process proceeded to allocate and compute the relative weight for each decision criterion to produce the best alternative and relative global weight.

a. Weights for Decision Criteria

Pairwise comparison was carried out as depicted in Table 36. The result in Table 37 provides the ranking of the criteria; Table 38 provides the consistency result, and Table 39 shows their weight. The Sabah claim had the highest importance in influencing the decision-making process of the Sultan Sulu, with the weight of 588 x 10^{-3}, followed by inclusion in the Bangsamoro Framework Agreement (309 x 10^{-3}), and Safety of his men (103x 10^{-3}).

Decision Criteria	Considerations
Bangsamoro Framework Agreement	Sultan Sulu needed to be accepted as member of the Framework to protect his family's ancestral right over Kingdom of Sulu.
Safety of the Sultan's Men	The intruders were armed with light firearms in limited numbers.
Revival of Sabah Claim	The idea was to get Malaysia to the negotiating table over the Sabah issue, and increase the Sabah quit rent. Moreover, to draw international attention to force Malaysia to come to the negotiating table.

Table 36. Considerations in decision criteria.

	Bangsamoro Framework Agreement	Safety of Men	Sabah Claim
Bangsamoro Framework Agreement	**1**	4	1/2
Safety of Men	1/4	**1**	1/5
Sabah Claim	2	5	**1**

Table 37. Pairwise matrix of decision criteria.

λ	3.00518049
CI	0.00259024
RI	0.52
CR=	0.00498124
	consistent

Table 38. Consistency result.

Eigenvector Criterion Weights	
Bangsamoro Framework Agreement	0.309245961
Safety of Men	0.103231598
Sabah Claim	0.587522442

Table 39. Weight of decision criteria.

b. Weights for Alternatives under Bangsamoro Framework Agreement

Table 40 shows the probable result of choosing a particular decision under the Bangsamoro Framework Agreement criterion. The probable alternative was generated through the understanding of PESTEL analysis provided in Chapter III. It provided guidelines to make the pairwise comparison shown in Table 41. The pairwise consistency is shown in Table 42. The result of the local weight for each alternative is depicted in Table 43. Outcome 4 has the highest value in influencing the decision-making process of Sultan Sulu, followed by Outcome 3, Outcome 2 and Outcome 1, respectively. This means that letting Malaysia assault, and the intruders retaliate in self defense, would be most beneficial in order to be considered as a member of the Bangsamoro Framework Agreement, and hence protecting the sultan's ancestral right to the Kingdom of Sulu.

Bangsamoro Framework Agreement	Probable Results
Outcome 1	The strategy to leave Sabah peacefully would not produce the required results. It would just expose sultan's weak position.
Outcome 2	Getting the men to lay down arms without resistance would not produce the required results, but it would degrade Malaysia's goodwill and reputation among Mindanao Muslims and their support for the peace effort.
Outcome 3	Might prove that they have the means to influence the decision.
Outcome 4	Might prove that they have the means to influence the decision and damage Malaysia's credibility as a broker of the Framework.

Table 40. The probable results of alternatives under Bangsamoro Framework Agreement criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	**1**	1/2	1/4	1/5
Outcome 2	2	**1**	1/2	1/4
Outcome 3	4	2	**1**	1/2
Outcome 4	5	4	2	**1**

Table 41. Pairwise matrix on alternatives under Bangsamoro Framework Agreement criterion.

λ	4.00498
CI	0.00166
RI	0.89
CR=	0.00186
	consistent

Table 42. Consistency result.

Eigenvector Alternatives (Bangsamoro Framework Agreement)	
Outcome 1	0.086514
Outcome 2	0.133588
Outcome 3	0.267176
Outcome 4	0.512723

Table 43. Weight of alternatives under Bangsamoro Framework Agreement criterion.

c. Weights for Alternatives under Safety of the Sultan's Men Criterion

Table 44 shows the probable alternative of employing a particular decision under the Safety of Sultan's men (intruders) criterion. The probable alternative was generated through the understanding of PESTEL analysis provided in Chapter III. It provided guidelines for the pairwise comparison shown in Table 45. The pairwise consistency is shown in Table 46, and the result of the local weight for each alternative is shown in Table 47. Outcome 1 has the highest value in influencing the decision-making process of Sultan Sulu, followed by Outcome 3, Outcome 2 and Outcome 4, in order of preference. This means that the best alternative for the safety of the sultan's men was to take the Malaysian offer and leave Sabah peacefully.

Safety	Probable Results
Outcome 1	The intruders leave Sabah safely.
Outcome 2	The intruders are safe from any aggression but would face the Malaysian law.
Outcome 3	The intruders would be safe but in a hostile environment.
Outcome 4	The intruders would have a high probability of casualties.

Table 44. The probable result of alternatives under Safety of Sultan's Men criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	**1**	3	2	4
Outcome 2	1/3	**1**	1/2	2
Outcome 3	1/2	2	**1**	3
Outcome 4	1/4	1/2	1/3	**1**

Table 45. Pairwise matrix of alternatives under Safety of the Sultan's Men criterion.

λ	4.00789
CI	0.00263
RI	0.89
CR=	0.00295
	consistent

Table 46. Consistency result.

Eigenvector Alternatives (Safety of Sultan's Men)	
Outcome 1	0.479866
Outcome 2	0.155397
Outcome 3	0.262146
Outcome 4	0.102592

Table 47. Weights for alternatives under Safety of the Sultan's Men criterion.

d. Weights for Alternatives under Sabah Claim Criterion

Table 48 shows the probable results of choosing a particular strategy under the Sabah Claim criterion. The probable alternative is generated through the understanding of PESTEL analysis provided in Chapter III. It provided guidelines for pairwise comparison as shown in Table 49. The comparison consistency is shown in Table 50, and the result of the local weight for each alternative is shown in Table 51. Outcome 4 had the highest potential to influence the decision-making process of the sultan, followed by Outcome 3, Outcome 2 and Outcome 1. This means that the best alternative was to put up a fight as determined in Outcome 4.

Sabah Claim	Probable Results
Outcome 1	The strategy to leave Sabah would not produce the required results. It only showed that the sultan's position was weak.
Outcome 2	Being captured without resistance would not produce the required results, but it could fuel the anger of the Sulu people.
Outcome 3	Might prove that they have the means and will to use aggression if necessary.
Outcome 4	Might prove that they have the determination to defend their rights on Sabah through aggression, and increase the cost to the Malaysian government if Malaysia still refused to negotiate on the issue of the Sabah claim.

Table 48. The probable results of alternatives under Sabah Claim criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	**1**	1/2	1/4	1/5
Outcome 2	2	**1**	1/2	1/4
Outcome 3	4	2	**1**	1/2
Outcome 4	5	4	2	**1**

Table 49. Pairwise matrix of alternatives under Sabah Claim criterion.

λ	4.00498
CI	0.00166
RI	0.89
CR=	0.00186
	consistent

Table 50. Consistency result.

Eigenvector Alternatives (Sabah Claim)	
Outcome 1	0.086514
Outcome 2	0.133588
Outcome 3	0.267176
Outcome 4	0.512723

Table 51. Weight for alternatives under Sabah Claim criterion.

e. Global Weight for Each Alternative

The decision criteria weights and local alternative weight were computed in the global weight matrix shown in Table 52. The result in Table 53 shows that Outcome 4 would be most preferred by the sultan. The next alternative in order of preference was Outcome 3, Outcome 2 and Outcome 1. The best alternative for the sultan was to engage in violence.

Decision Criteria	4 x 1	4 x 4 Matrix		
		Bangsamoro Framework Agreement	Safety of Men	Sabah Claim
Bangsamoro Framework Agreement	0.309246	0.086514	0.479866	0.086514
Safety of Men	0.103232	0.133588	0.155397	0.133588
Sabah Claim	0.587522	0.267176	0.262146	0.267176
	0	0.512723	0.102592	0.512723

Table 52. Global weight matrix.

Alternatives	Values
Outcome 1	0.1271203 (127.1203 x 10^{-3})
Outcome 2	0.13583919 (135.83919 x 10^{-3})
Outcome 3	0.26665632 (266.65632 x 10^{-3})
Outcome 4	0.4703842 (470.3842 x 10^{-3})

Table 53. Global weights for alternatives of Sultan Sulu.

C. SENSITIVITY ANALYSIS

In sensitivity analysis 1, MNLF was introduced into the equation of PESTEL analysis. The assumption is that Misuari has convinced MNLF fighters to support the sultan's men. The context of concerns for both players could have changed; however, for this example, the present decision criteria were maintained but in a different context. If MNLF's threat was credible, the relative preferences were developed to see any differences in global weights. Results in Table 54 through Table 57 suggest that there was a slight increase in cost value and credibility value. Even the Malaysian credibility criterion had jumped to third position. The prime minister has the same preference as the case study on all alternatives according to decision criterion preference. Nevertheless, the global weight of the alternative maintained the same ranking as in the case study result. So, it could be expected to have a similar alternative in game theory as Sultan Sulu's

preferred alternative did not change significantly with the introduction of the MNLF threat.

	Political Survival	Cost	Social Unrest	Credibility
Political Survival	**1**	2	4	3
Cost	1/2	**1**	3	2
Social Unrest	1/4	1/3	**1**	1/2
Credibility	1/3	1/2	2	**1**

Table 54. Pairwise matrix.

λ	4.00788783
CI	0.00262928
RI	0.89
CR=	0.00295424
	consistent

Table 55. Consistency result.

Eigenvector Criterion Weights	
Political Survival	0.479865505
Cost	0.262145561
Social Unrest	0.102591936
Credibility	0.155396998

Table 56. Decision criteria weight.

Alternatives	Values
Outcome 1	0.32764656
Outcome 2	0.36089132
Outcome 3	0.13240449
Outcome 4	0.17905763

Table 57. Global weight.

In sensitivity analysis 2, a different set of inputs is introduced to the game's PESTEL analysis: MNLF threat was credible, the thirteenth general elections were not in the near future, and international institutions such as the United Nations and the U.S. backed Sultan Sulu. Only the Prime Minister of Malaysia was affected by these inputs. So, only the prime minister's response will be analyzed in this exercise. Sultan Sulu maintains the same response as in the case study. The result of the prime minister's decision criteria is shown in Table 58 through Table 60. The Cost and Malaysian Credibility criteria occupied the top two places, and Political Survival ended up in the last position. Interestingly, political survival has dropped to the last position of preference.

	Political Survival	Cost	Social unrest	Credibility
Political Survival	**1**	1/5	1/3	1/4
Cost	5	**1**	3	2
Social Unrest	3	1/3	**1**	1/2
Credibility	4	1/2	2	**1**

Table 58. Pairwise matrix for sensitivity analysis 2.

λ	4.01195373
CI	0.00398458
RI	0.89
CR=	0.00447705
	consistent

Table 59. Consistency result.

Eigenvector Criterion Weights	
Political Survival	0.080820429
Cost	0.491353454
Social Unrest	0.160178301
Credibility	0.267647816

Table 60. Decision criteria matrix for sensitivity analysis 2.

Subsequently, Table 61 through Table 64 display the results for the alternative preference in relation to the Political Survival criterion. This result was followed by Table 65 through Table 68 for Cost criterion, Table 69 through Table 72 for the Local Unrest criterion, Table 73 through Table 76 for the Credibility criterion and Table 77 for the Global Weight for Alternative in sensitivity analysis 2. It was observed that the prime minister responded differently to the introduced inputs. The result in Table 77 shows that Outcome 1 is his top preference, followed by Outcome 3, Outcome 2, and Outcome 4, accordingly. This exercise demonstrates that AHP analysis of this model with the same decision criteria could accommodate and respond accordingly to a different possibility from PESTEL analysis.

Political Survival	Probable Results
Outcome 1	International politics have precedence over domestic politics. Regional and international pressures effects are the least to Malaysia.
Outcome 2	This action will satisfy domestic politics. But there could be some retaliation from MNLF and pressure from other international organizations. It also could impact Malaysia's economy, such as boycotts at the international level.
Outcome 3	Stalemate for both belligerents.
Outcome 4	Regional and international political pressure will be the greatest.

Table 61. Probable result of each alternative against Political Survival criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	1	3	2	6
Outcome 2	1/3	1	1/2	4
Outcome 3	1/2	2	1	4
Outcome 4	1/6	1/4	1/4	1

Table 62. Pairwise matrix of alternatives under Political Survival criterion.

λ	4.01597
CI	0.00532
RI	0.89
CR=	0.00598
	consistent

Table 63. Consistency result.

Eigenvector Alternatives (Political Survival)	
Outcome 1	0.498567
Outcome 2	0.163733
Outcome 3	0.26709
Outcome 4	0.07061

Table 64. Local weight alternative under Political Survival in sensitivity analysis 2.

Cost	Probable Results
Outcome 1	The least human and financial cost.
Outcome 2	Retaliation from regional and international forces increase cost for Malaysia (e.g., boycott or military actions).
Outcome 3	Increased cost due to prolonged siege.
Outcome 4	The highest cost affected Malaysia as regional and international forces support Sultan Sulu's fight.

Table 65. Probable result of each alternative against Cost criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	1	3	2	5
Outcome 2	1/3	1	1/3	4
Outcome 3	1/2	3	1	2
Outcome 4	1/5	1/4	1/2	1

Table 66. Pairwise matrix of alternatives under Cost criterion.

λ	4.20198
CI	0.06733
RI	0.89
CR=	0.07565
	consistent

Table 67. Consistency result.

Eigenvector Alternatives (Cost)	
Outcome 1	0.480531
Outcome 2	0.155425
Outcome 3	0.268439
Outcome 4	0.095606

Table 68. Local weight alternative under Cost in sensitivity analysis 2.

Local Unrest	Probable Results
Outcome 1	The best action as it reduced the duration of the unrest situation among the locals.
Outcome 2	Could trigger wider area of unrest if other regional and international forces interfere in the crisis.
Outcome 3	Prolong unrest.
Outcome 4	The worst action as a wider area could be affected as regional and international forces become involved in the crisis directly.

Table 69. Probable result of each alternative under Local Unrest criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	**1**	2	3	4
Outcome 2	1/2	**1**	2	3
Outcome 3	1/3	1/2	**1**	2
Outcome 4	1/4	1/3	1/2	**1**

Table 70. Pairwise matrix of alternatives under Local Unrest criterion.

λ	4.00789
CI	0.00263
RI	0.89
CR=	0.00295
	consistent

Table 71. Consistency result.

Eigenvector Alternatives (Local Unrest)	
Outcome 1	0.479866
Outcome 2	0.262146
Outcome 3	0.155397
Outcome 4	0.102592

Table 72. Local weight alternative under Local Unrest in sensitivity analysis 2.

Credibility	Probable Results
Outcome 1	The best result especially for the long term regional stability.
Outcome 2	It will adversely affect the long term regional stability effort.
Outcome 3	Stalemate for both belligerents. Mild effect on the long term regional stability effort.
Outcome 4	The worst effect on the long term regional stability effort.

Table 73. Probable result of each alternative against Credibility criterion.

	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Outcome 1	**1**	4	2	6
Outcome 2	1/4	**1**	1/4	1/2
Outcome 3	1/2	4	**1**	4
Outcome 4	1/6	2	1/4	**1**

Table 74. Pairwise matrix of alternatives under Credibility criterion.

λ	4.10149
CI	0.03383
RI	0.89
CR=	0.03801
	consistent

Table 75. Consistency result.

Eigenvector Alternatives (credibility)	
Outcome 1	0.519923
Outcome 2	0.101509
Outcome 3	0.28643
Outcome 4	0.092138

Table 76. Local weight alternative under Credibility in sensitivity analysis 2.

Alternatives	Values
Outcome 1	0.49242524
Outcome 2	0.15876015
Outcome 3	0.2550381
Outcome 4	0.09377651

Table 77. Global weights for alternatives of sensitivity analysis 2.

D. CHAPTER CONCLUSION

This chapter has demonstrated the viability of PESTEL analysis's results to fit in AHP analysis. AHP analysis successfully translates both players' concerns and degrees of concern in a quantitative representation. It also produced the global weights of the alternatives as a quantitative representation of each player's preferred solution to the crisis. The highest value of global weight is translated as the best relative preference. This analysis suggests that the prime minister's most preferred solution in solving the crisis is Outcome 2, followed by Outcome 1, Outcome 4, and Outcome 3. Meanwhile Sultan Sulu's most preferred solution is Outcome 4 followed by Outcome 3, Outcome 2, and Outcome 1.

By carrying out sensitivity analysis, we show that AHP analysis is responsive to different inputs according to the degree of the players' responses toward these inputs. It shows the proposed AHP analysis is flexible to accommodate different inputs.

Subsequently, both players' global weights will be used as payoff for the game theory analysis, another phase of analysis which focuses on interaction between players.

V. GAME THEORY MODEL ANALYSIS

This chapter analyzes and discusses the findings using game theory model analysis. The payoffs from Chapter IV are analyzed through the game theory model to determine the best strategy to be adopted by both rational players. The result of this analysis will be discussed to answer the research question. Two sets of game will be analysed in this chapter, which is the case study itself and the sensitivity analysis.

A. CASE STUDY GAME

The interaction between the prime minister and Sultan Sulu is depicted in Figure 13. Both players have two strategies to choose from. Each player will calculate the probable response from the other player. The expected outcome is depicted by outcome payoffs. These payoffs are generated from the global weights of AHP analyses carried out in Chapter IV. The payoffs values are presented as nearest value of 10^{-3}. The value on the left of each outcome box represents payoff for the prime minister, while the value on the right represents payoff for Sultan Sulu with exponent units are omitted for the ease of calculation. For example, the payoffs in the outcome box of 296,127 mean the value 296 is the prime minister's payoff for selecting the *Negotiate* strategy (after the value of Outcome 1 in global weight of alternatives for prime minister), while 127 is Sultan Sulu's payoff when choosing the *Leave* strategy (after the value of Outcome 1 in global weight of alternatives for Sultan Sulu).

		Sultan Sulu		
		Leave		Fight
Prime Minister	Negotiate	296, 127		123, 267
	Assault	390, 136		191, 470

Figure 13. Both players' payoffs.

1. Partial Sum Strategic Move Without Communication

This analysis starts off by looking into the prime minister's response to Sultan Sulu, without there being any communication between them. The prime minister, represented in Figure 14 by blue arrows, employs the same strategy (i.e., *Assault*), regardless of Sultan Sulu's strategies. This means the prime minister has a dominant *Assault* strategy. The prime minister is prepared to disarm the intruders by force and charge them in accordance with Malaysian law even if they surrender to the security forces.

		Sultan Sulu		
		Leave		Fight
Prime Minister	Negotiate	296, 127		123, 267
				
	Assault	390, 136		191, 470

Figure 14. Prime minister's response.

Likewise, as shown in Figure 15 with red arrows, Sultan Sulu responds with the same strategy (i.e., *Fight*) regardless of the prime minister's strategies. This means Sultan Sulu also has a dominant (*Fight*) strategy. Sultan Sulu determines to order his men to stay put at Tanduo, and be ready to fight until the end.

		Sultan Sulu		
		Leave		Fight
Prime Minister	Negotiate	296, 127		123, 267
	Assault	390, 136		191, 470

Figure 15. Sultan Sulu's response.

The interaction of both players' preferences is shown in Figure 16 using arrows for both colors. The flow of the arrows indicates the players' responses and the box with only incoming arrows indicates a Nash Equilibrium. A Nash Equilibrium means that both players could not unilaterally improve their position with their own strategies. The Nash Equilibrium for this interaction is the outcome with the payoff of 191, 470, where the Prime Minster plays *Assault* and Sultan Sulu plays *Fight*. So, the probable outcome of both players' interactions, without any communication between them, is to resolve the crisis through armed conflict (Assault-Fight).

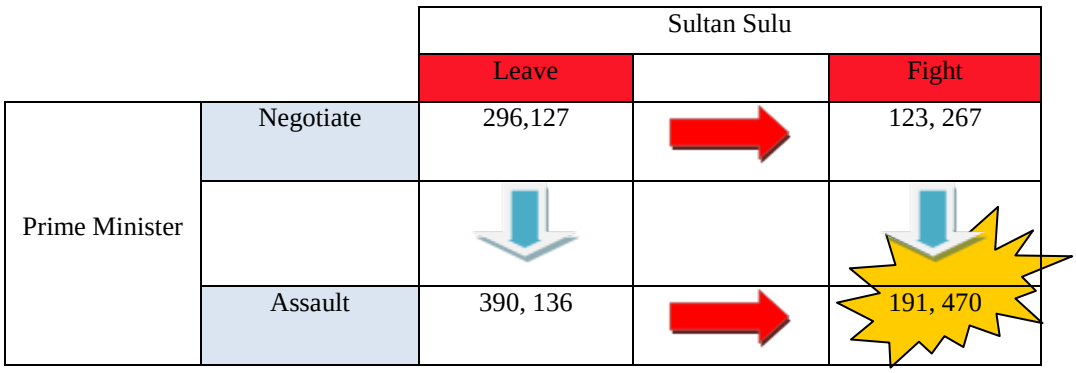

Figure 16. Interaction of prime minister and Sultan Sulu strategies.

2. Partial Sum Strategy—Make the First Move

This section analyzes the possible outcomes when a player moves first and makes his move known to the other player, or communicates before making the move. This strategic move consists of first move, threat, promise, and a combination of threat and promise. For this strategic move, both players are assumed to play conservatively their maximum strategy. In the Nash Equilibrium, Sultan Sulu has the maximum payoff option, while the Prime Minister of Malaysia has the third best payoff option. So in this section, the focus will be on the prime minister's strategic moves to maximize his payoff and make it superior to the Nash Equilibrium payoff.

The prime minister's strategic moves start off with his first move strategy. According to the prime minister's calculation—whether his preferred strategy is Negotiation or Assault—Sultan Sulu should always choose the *Fight* strategy to

maximize his payoff. The steps and payoff of relevant outcomes are depicted in Table 78. So the prime minister is likely to make the first move using the *Assault* strategy, and Sultan Sulu responds with the *Fight* strategy; or the prime minister can make the Sultan make the first move. It was found that regardless of the strategy chosen by Sultan Sulu, the prime minister will always choose the *Assault* strategy. The steps and relevant payoffs are depicted in Table 79. So, the likely outcome is that Sultan Sulu makes the first move with *Fight* strategy and the Prime Minister of Malaysia responds with the *Assault* strategy. The result of the *first move strategy* shows that regardless of who moves first, the outcome remains the same, and consistent with Nash Equilibrium payoff.

Steps	First Move: Prime Minister	Outcome Payoffs
1	If Negotiate, then Sultan Sulu Fight	123, 267
2	If Assault, then Sultan Sulu Fight	191, 470
3	Likely outcome: Prime Minister Assault, then Sultan Sulu Fight	191, 470

Table 78. Prime minister makes the first move.

Steps	First Move: Sultan Sulu	Outcome Payoffs
1	If *Leave*, then Prime Minister *Assault*	390, 136
2	If *Fight*, then Prime Minister *Assault*	191, 470
3	Likely outcome	191,470

Table 79. Prime minister forces Sultan Sulu to make the first move.

The outcome in the first move strategy for the prime minister does not improve his payoff. So, the next strategy to improve the prime minister's payoff is to explore a threat strategy. In this case, the threat is to be communicated to Sultan Sulu. The prime minister wants to persuade Sultan Sulu to choose the *Leave* strategy instead of the *Fight* strategy. If Sultan Sulu does not cooperate and still insists on using the *Fight* strategy, the prime minister would choose the *Negotiation* strategy instead of the *Assault* strategy, where both players will suffer as a consequence. It turns out the threat is credible, and

this outcome ceases to be an option. The steps and relevant payoffs are depicted in steps 1 to 3 of Table 80. Nevertheless, Sultan Sulu will re-evaluate his options. If he plays the *Leave* strategy, the prime minister will play the *Assault* strategy, and if he chooses the *Fight* strategy, he only leaves the prime minister to choose the *Negotiation* strategy. As shown in steps 4 to 6 of Table 80, the payoff from the *Fight* strategy is better than that of the *Leave* strategy for Sultan Sulu. He will definitely choose the *Fight* strategy to maximize his payoff. So, even though the prime minister's threat is credible, it does not work to persuade Sultan Sulu to cooperate.

Steps	Prime Minister's Threat Strategy: Prime Minister wants Sultan Sulu to *Leave*, and thus threatens with *Fight*. Both will lose in payoff.	Payoffs
1	If Sultan Sulu plays *Fight*, the Prime Minister uses *Negotiate*.	123, 267
2	Normally, if Sultan Sulu plays *Fight*, the Prime Minister should *Assault.*	191, 470
3	Both players lose and threat could work.	191, 470 is then deleted.
4	But if Sultan Sulu plays *Leave*, the Prime Minister will play *Assault.*	390, 136
5	If Sultan Sulu plays Fight, only one payoff is available.	123, 267
6	So, Sultan Sulu will play *Fight* instead of *Leave* to maximize his payoff. Therefore, the Prime Minister's threat does not work.	

Table 80. Prime minister's threat strategy.

Clearly, the threat strategy does not work to improve the prime minister's payoff, and he could explore a promise strategy. He could offer Sultan Sulu a promise that if he chooses the *Leave* strategy, the prime minister would choose the *Negotiation* strategy, thereby hurting himself. As shown in Table 81, Sultan Sulu also suffers. As Sultan Sulu is not improving his payoff, so this is not a valid promise. So, the prime minister's promise does not work to persuade Sultan Sulu to cooperate.

Steps	Prime Minister's promise strategy: Prime Minister wants Sulu to *Leave*, promises *to allow Sultan to exercise Leave* (where Prime Minister will lose and Sultan Sulu gains).	Payoffs
1	If Sultan Sulu plays *Leave*, Prime Minister promises *Negotiate.*	296, 127
2	Rationally, if Sultan Sulu plays *Leave*, Prime Minister will *Assault.*	390, 136
3	Prime Minister loses and so does Sultan Sulu. Therefore, the promise strategy also does not work.	

Table 81. The prime minister's promise strategy.

All strategy moves explored above do not improve the prime minister's payoff. The only available choice is either to go for a Nash Equilibrium solution or first move strategy. So, the most likely outcome in strategic moves is for the prime minister to employ an *Assault* strategy and Sultan Sulu to employ a *Fight* strategy. So, both players resort to the use of force.

3. Security Level and Arbitration

Strategic moves have failed to improve the prime minister's payoff. Now, let us analyze the possibility of arbitration. Figure 17 shows the security level game for prime minister. The blue arrows represent the prime minister's efforts to maximize his payoff, while the red arrows are Sultan Sulu's efforts to minimize the prime minister's payoff. The box contains 191 does not have any arrow coming out from it. So the security level for the prime minister is 191, as departure payoff in arbitration.

		Sultan Sulu		
		Leave		Fight
Prime Minister	Negotiate	296	→	123
		↓		↓
	Assault	390	→	191

Figure 17. Prime minister's security level.

Figure 18 shows the security level game for Sultan Sulu. The red arrows represent Sultan Sulu's efforts to maximize his payoff while the blue arrows are the prime minister's efforts to minimize Sultan Sulu's payoff. The box contains 267 does not have any arrow coming out from it. So the security level for the prime minister is 267, as departure payoff in arbitration.

		Sultan Sulu		
		Leave		Fight
Prime Minister	Negotiate	127		267
				
	Assault	136		470

Figure 18. Sultan Sulu's security level.

Figure 19 shows the security level of both players on a graph. Dotted red line is Sultan Sulu security level, while the dotted blue line is for the prime minister. It clearly shows that the intersection of both players' security levels produce a status quo (SQ) at coordinate 191, 267. SQ will be the departure point to find the Nash solution point or Nash point by moving Northeast toward the line linking the Outcome 4 and Outcome 2. Nash point is the fairest point for both players for arbitration (Straffin, 1993, pp. 105–109). Nash point is a coordinate on the line half the distance between Outcome 4 and Point A, where Point A is the intersection of Sultan Sulu security levels line and line between Outcome 4 and Outcome 2. The y axis value for the Nash Point is the point lies on the half distance between SQ and Outcome 4 while for x axis, the point lies between the half distance between SQ and Point A. The result is Nash point lies on coordinate 251.5, 368.5, which is closer to Outcome 4 than Outcome 2. So, it is clear that the only solution to resolve the conflict in Lahad Datu crisis is the use of force by Malaysian Security Forces, and for the Sultan Sulu's men to retaliate with force in self-defense.

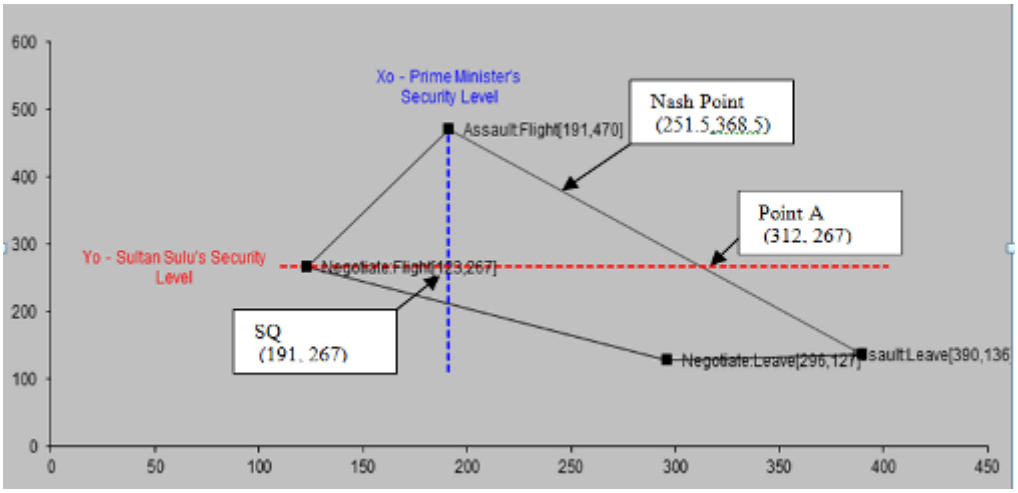

Figure 19. Graph of security level for prime minister and Sultan Sulu.

B. SENSITIVITY ANALYSIS GAME

Only sensitivity analysis 2 will be shown in this section. The interaction between the prime minister and Sultan Sulu is depicted in Figure 20. Both players have two strategies to choose from. Each player will calculate the probable response from the other player. The expected outcome is depicted by outcome payoffs. These payoffs are generated from the AHP sensitivity analysis 2 carried out in Chapter IV.

		Sultan Sulu		
		Leave		Fight
Prime Minister	Negotiate	492,127		255, 267
	Assault	159, 136		94, 470

Figure 20. Both players payoffs

1. Partial Sum Strategic Moves Without Communication

This analysis begins by looking into the prime minister's response to Sultan Sulu, without there being any communication between them. The prime minister, represented in Figure 21 by the blue arrows, employs the same strategy, *Negotiate*, regardless of

Sultan Sulu's strategies. This means the prime minister has a dominant *Negotiate* strategy.

As shown in Figure 21 by the red arrows, Sultan Sulu responds with the same strategy (i.e., *Fight*) regardless of prime minister's strategies. This means Sultan Sulu also has a dominant (*Fight*) strategy. Sultan Sulu determines to order his men to stay put at Tanduo, and be ready to fight to the end until their demands are met.

Meanwhile, the interaction of both players' preferences is shown in Figure 21 using arrows of both colors. The flow of the arrows indicates the players' responses and the box with only incoming arrows indicates a Nash Equilibrium. A Nash Equilibrium means that neither player could unilaterally improve his position with his own strategy. The Nash Equilibrium for this interaction is the outcome with a payoff of 255, 267, where the Prime Minister plays *Negotiate* and Sultan Sulu plays *Fight*. The probable outcome of both players' interaction, without any communication between them, is the prime minister willing to *Negotiate* but Sultan Sulu insisting on *Fighting*.

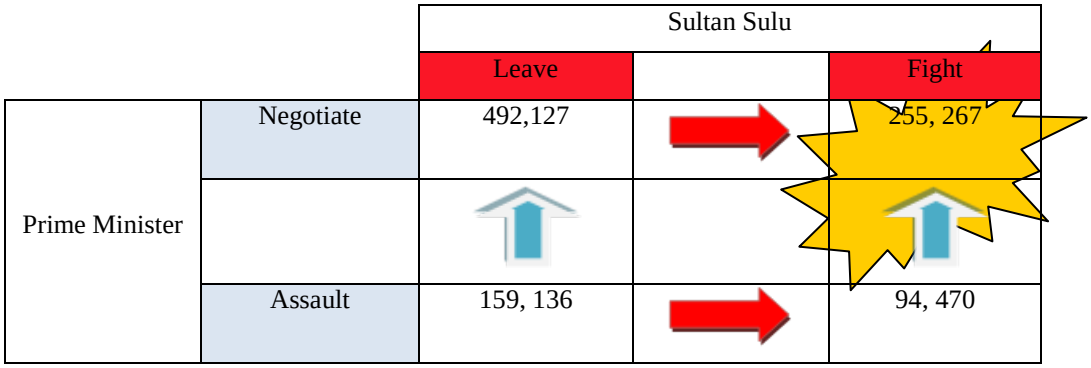

Figure 21. Interaction of prime minister and Sultan Sulu strategies.

2. Partial Sum Strategy—Make the First Move

In the Nash Equilibrium, both players do not have the best payoff option. In this section, the focus will be on the prime minister's strategic moves to maximize his payoff and make it superior to the Nash Equilibrium payoff.

The prime minister's strategic moves begin with the first move strategy. By the prime minister's calculation—regardless of whether his preferred strategy is *Negotiation* or *Assault*—Sultan Sulu would always choose the *Fight* strategy to maximize his payoff. The steps and payoff of relevant outcomes are depicted in Table 82. The prime minister is likely to make the first move using the *Negotiate* strategy, and Sultan Sulu responds with a *Fight* strategy; or the prime minister can force the Sultan to make the first move. It was found that regardless of the strategy chosen by Sultan Sulu, the prime minister will always choose the *Negotiation* strategy. The steps and relevant payoffs are depicted in Table 83 So, the likely outcome is that Sultan Sulu makes the first move using the *Fight* strategy and the prime minister responds using the *Negotiation* strategy. The result in the first move strategy shows that player who moves first achieves the same payoff as the Nash Equilibrium payoff. So, without any communication, prime minister is better off with the *Negotiation* strategy.

Steps	First Move: Prime Minister	Outcome Payoffs
1	If *Negotiate*, then Sultan Sulu uses *Fight.*	255, 267
2	If *Assault*, then Sultan Sulu uses *Fight.*	94, 470
3	Likely outcome: The Prime Minister uses *Negotiate*, then Sultan Sulu uses *Fight.*	255, 267

Table 82. Prime minister's first move.

Steps	First Move: Sultan Sulu	Outcome Payoffs
1	If *Leave*, then the Prime Minister uses *Negotiate.*	492, 127
2	If *Fight*, then the Prime Minister uses *Negotiate.*	255, 267
3	Likely outcome.	255, 267

Table 83. Prime minister forces Sultan Sulu to move first.

The outcome in the first move strategy for the prime minister does not improve his payoff. The next strategy to improve the prime minister's payoff is to explore a threat strategy (Table 83). In this case, the threat is to be communicated to Sultan Sulu. The

prime minister wants to persuade Sultan Sulu to choose the *Leave* strategy instead of the *Fight* strategy. If Sultan Sulu does not cooperate and still insists on the *Fight* strategy, the prime minister would choose the *Assault* strategy instead of the *Negotiation* strategy where the prime minister loses, but Sultan Sulu gains. Therefore, there is no threat.

Steps	Prime Minister's Threat Strategy: Prime Minister wants Sultan Sulu to *Leave*, and thus threatens to *Fight*. Both will lose in payoff.	Payoffs
1	If Sultan Sulu uses *Fight*, the Prime Minister uses *Assault*.	94, 470
2	Normally, if Sultan Sulu chooses *Fight*, the Prime Minister should use *Negotiate.*	255, 267
3	The Prime Minister loses, but Sultan Sulu gains; so, there is no threat.	

Table 84. Prime minister's threat strategy.

The threat strategy does not work to improve the prime minister's payoff, and he could explore a promise strategy. He could offer Sultan Sulu a promise that if he chooses a *Leave* strategy, the prime minister would also use an *Assault* strategy, thereby hurting himself. Sultan Sulu would gain. Therefore, payoff 169, 136 can be deleted. Sultan Sulu calculates that whatever move he makes the prime minister resorts to *Negotiate*. Sultan Sulu plays *Fight* to maximize his utility. So, the promise does not work for the prime minister. The promise strategy's moves are depicted in Table 85.

Steps	Prime Minister's promise strategy: Prime Minister wants Sulu to choose *Leave*, promises to allow Sultan to exercise *Leave* (where Prime Minister will lose and Sultan Sulu gains).	Payoffs
1	If Sultan Sulu chooses *Leave*, the Prime Minister uses *Assault.*	159, 136
2	Normally, if Sultan Sulu uses *Leave*, the Prime Minister uses *Negotiate.*	492, 127
3	The Prime Minister loses; Sultan Sulu gains. Therefore, there could be a promise.	159, 136 is deleted
4	For Sultan Sulu, if his move is *Leave*, the Prime Minister uses *Negotiate*.	492, 127
5	If Sultan Sulu chooses *Fight*, the Prime Minister uses *Negotiate*.	255, 267
3	Sultan Sulu will select *Fight*; so, the promise does not work.	

Table 85. Prime minister's promise strategy.

All previously explored, strategic moves do not improve the prime minister's payoff. The only available choice is either to go for a Nash Equilibrium solution or first move strategy. The most likely outcome in strategic moves is for the Prime Minister to employ the *Negotiation* strategy and Sultan Sulu to employ the *Fight* strategy.

3. Security Level and Arbitration

Next, we will analyze the possibility of arbitration. The security level for each player is to be determined before proceeding with the arbitration process. The game will proceed by playing each player's payoffs separately. The player whose payoffs are being analyzed will maximize his payoff, while the opponent minimizes the other player's outcome.

Figure 22 shows the security level game for the prime minister. The blue arrows represent the prime minister's efforts to maximize his payoff, while the red arrows are Sultan Sulu's efforts to minimize the prime minister's payoff. The result shows that 255 is the security level for the prime minister.

		Sultan Sulu		
		Leave		Fight
Prime Minister	Negotiate	492	→	255
		↑		↑
	Assault	169	→	94

Figure 22. Prime minister's security level.

Figure 23 shows the security level game for Sultan Sulu. The red arrows represent Sultan Sulu's efforts to maximize his payoff, while the blue arrows are the prime minister's efforts to minimize Sultan Sulu's payoff. The result shows that 267 is the security level for Sultan Sulu.

		Sultan Sulu		
		Leave		Fight
Prime Minister	Negotiate	127	→	267
		↑		↑
	Assault	136	→	470

Figure 23. Sultan Sulu's security level.

Figure 24 shows the security level of both players on a graph to produce SQ, which is closer to the center of line joining Outcome 4 and Outcome 1. There is a 50 percent probability for both players to choose either violence (Outcome 4) or peace (Outcome 1) solution.

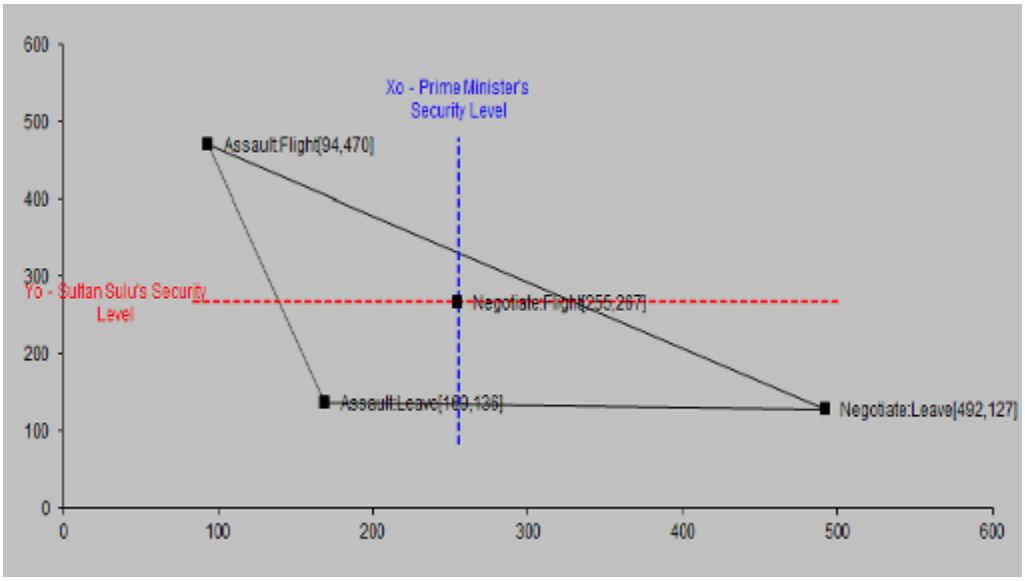

Figure 24. Graph of security level for prime minister and Sultan Sulu.

C. CHAPTER CONCLUSION

The game theory model shows that the most probable strategy in this case study is for the prime minister to employ *Assault*, while Sulu Sultan employs *Fight* as their solution to the crisis. This result is a justification that both players could not avoid violence to resolve the crisis.

The result also highlights that players do not necessarily go for their maximum payoff when the interaction with other player is taken into account. In the case study game, the prime minister's best payoff is in Outcome 2 where prime minister to play *Assault* strategy and for Sultan Sulu to *Leave*, but it turns out the best solution is for the prime minister to employ *Assault* and for Sultan Sulu to employ the *Fight* strategy. This shows that the proposed decision-making model offers detailed consideration to produce a precise solution. It also shows that the proposed decision-making model can offer insight into the Malaysian Prime Minister's decision by objectively structuring the exploration of possible environmental factors and interactions.

The sensitivity analysis shows that the introduction of external institutions inputs suggests a different result from the case study game. It suggests that there is a possibility for fair negotiation in Sabah standoff case, which would avoid violence action from both players. This indicates that different inputs in the initial phase of the model framework could change the result in later phases of the framework accordingly. This shows that these combined tools are sensitive to inputs and robust to accommodate the "what if" consideration.

VI. CONCLUSION

Our proposed model demonstrated the viability of the combined application of PESTEL, AHP and game theory. PESTEL analysis provided us with the macro environmental framework in structuring our search for the criteria of decision making for both players, i.e., the Malaysian Prime Minister and Sultan Sulu. We have successfully incorporated AHP to compensate for the game theory's weaknesses, as AHP is well known as a credible tool that translates qualitative criteria into a quantitative judgment. We analyzed the interactive decision-making process of the prime minister and Sultan Sulu using game theory, and found out that the players do not necessarily go for their maximum payoff when the interaction with the other player is taken into account.

We checked the viability of the model by its ability to help us better understand the dynamics behind the decision-making process of the Malaysian Prime Minister and Sultan Sulu in this case study of the Lahad Datu standoff. The research offered valuable insights into the crisis through the interactive decision-making process perspective, with consideration of macro environmental factors affecting both players. It also identified key elements that influenced the action of both players. Most importantly, our research provides a proposed structural framework, which can effectively be used for choosing the most appropriate course of action in any conflict situation. Moreover, we used sensitivity analysis to validate the robustness of the model.

The advantages of the combined model are that it mitigates the weaknesses in the individual applications of PESTEL, AHP, and game theory; and it conveniently uses them in support of each other to provide a viable, efficient, and robust framework. This framework not only helps us in better understanding the past, but can help remove mental fog when we are confronted by a decision situation. This not only helps structure scattered thoughts and make decisions more informed, but also provides an historical record for accountability and learning purposes.

The broad applications of this model are twofold: to study past situations and learn valid lessons, and to respond effectively when faced with a decision dilemma. The

proposed is a generic model of decision making, which can be used in any conflict situation. Its strength lies in its flexibility to accommodate all kinds of players and situations, from national crises to personal relationships.

We have seen the expansion of domains in PESTEL in an attempt to make it comprehensive. Further research can contemplate fusing ethical theories with PESTEL to broaden the scope of analysis. Another domain to include is the irrational value into the calculation. We also foresee a future study on the most probable common critical decision criteria used by decision makers especially during conflict, either individual or group focused. These identified critical decision making criteria could assist a decision maker in developing a heuristic decision-making process.

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